

# Instruction Manual

# alpha CON 2000

## Conductivity/ Total Dissolved Solids

## Controller / Transmitter



**EUTECH**  
**INSTRUMENTS**

*Technology Made Easy ...*

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CERTIFIED



68X216843 Rev 1 01/04



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## Preface

This manual serves to explain the use of the  $\alpha$ lpha CON 2000 Series. The manual functions in two ways, firstly as a step by step guide to help the user operate the instrument, and secondly as a handy reference guide. This instruction manual is written to cover as many anticipated applications of the  $\alpha$ lpha CON 2000 as possible. If you have any doubts concerning the use of the instrument, please do not hesitate to contact the nearest Eutech Instruments Authorised Distributor.

The information presented in this manual is subject to change without notice as improvements are made, and does not represent any commitment whatsoever on the part of Eutech Instruments.

Eutech Instruments will not accept any responsibility for damage or malfunction of the unit due to improper use of the instrument.

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Rev 1 01/04

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## Safety Information

This Eutech Instruments Controller/ Transmitter shall be installed and operated only in the manner specified in the Instruction manual. Only skilled, trained or authorised person should carry out installation, setup and operation of the instrument.

Before powering up the unit, make sure that power source it is connected to, is as specified in the top label. Failure to do so may result in a permanent damage to the unit.

The unit has live and exposed parts inside. If it has to be opened, make sure that the power to the unit is off and disconnected.

The unit is Fuse protected. In the event the fuse has to be replaced, use only those as specified in the manual.

The degree of protection against electric shock will be achieved only by observance of the corresponding installation rules.

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## 1 INTRODUCTION

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### 1.1 At the very beginning

We thank you for having purchased the Eutech Instruments alpha CON 2000.

The construction of the alpha CON 2000 employs leading edge technology and complies with safety regulations currently in force. Notwithstanding this, improper use could lead to hazards for the user or a third-party, and/or adverse effects on the plant or other equipment. **Therefore, the operating instructions must be read and understood by the persons involved before work is started with the alpha CON 2000.**

Eutech Instruments do not accept any liability for damage that may arise from neglecting information given in this manual.

This instruction manual identifies safety instructions and additional information by means of the following symbols:



This symbol draws attention to **safety instructions and warnings of potential danger** which, if neglected, could result in injury to persons and/or damage to property.



This symbol identifies **additional information and instructions** which, if neglected, could lead to inefficient operation and possible loss of production.

The instruction manual must always be stored close at hand, in a place accessible to all people working with the alpha CON 2000.

If you have questions, which are not or insufficiently answered in this instruction manual, please contact your Eutech Instruments supplier. He will be glad to assist you.

### 1.2 Intended use

Eutech Instruments alpha CON 2000 is intended solely for conductivity and temperature measurement, as described in this instruction manual.

Any other use, or use not mentioned here, that is incompatible with the technical specifications is deemed inappropriate. The operator is solely responsible for any damage arising from such use.

Other prerequisites for appropriate use include:

- observing the instructions, notes and requirements set out in this instruction manual.
- observing all local safety regulations concerning safety at work.
- observing all information and warnings in the documentation dealing with the products used together with the transmitter (housings, sensors, etc.).
- observing the prescribed environmental and operational conditions.

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### 1.3 Safety instructions

The alpha CON 2000 should be installed and operated only by personnel familiar with the transmitter and who are qualified for such work.

A defective transmitter must neither be installed nor put into service.

The alpha CON 2000 must only be operated under the specified operating conditions (see section 8).



The alpha CON 2000 must not be repaired by the customer.

The alpha CON 2000 must only be opened to replace the unit fuse or to set the jumper for Pt100/Pt1000 temperature sensor. This work must be carried out only by personnel familiar with the transmitter and who are qualified for such work. Make sure the mains cable is separated from the power supply before opening the unit.

No modifications to the alpha CON 2000 are allowed. The manufacturer/supplier accepts no responsibility for damage caused by unauthorised modifications. The risk is borne entirely by the user.

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### 1.4 Putting out of service / Correct disposal of the unit

#### Putting out of service

- First disconnect the unit from the mains, then undo all electrical connections.
- Remove the unit from the wall / panel.

#### Correct disposal of the unit

When the transmitter is finally taken out of service, observe the local environmental regulations for correct disposal or send the transmitter to your local Eutech Instruments distributor, they will take care of proper disposal.

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## 2 PRODUCT DESCRIPTION

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### 2.1 Description of unit

The Eutech Instruments alpha CON 2000 is used for measuring conductivity and temperature values. The conductivity values can be measured using limit or P/PI control. The transmitter is available in two versions, one for panel mounting and one for wall mounting in a enclosure. The transmitter can be used for applications such as water treatment and monitoring, galvanic-decontamination, chemical processing, food processing, clean or wastewater control and neutralisation processes.

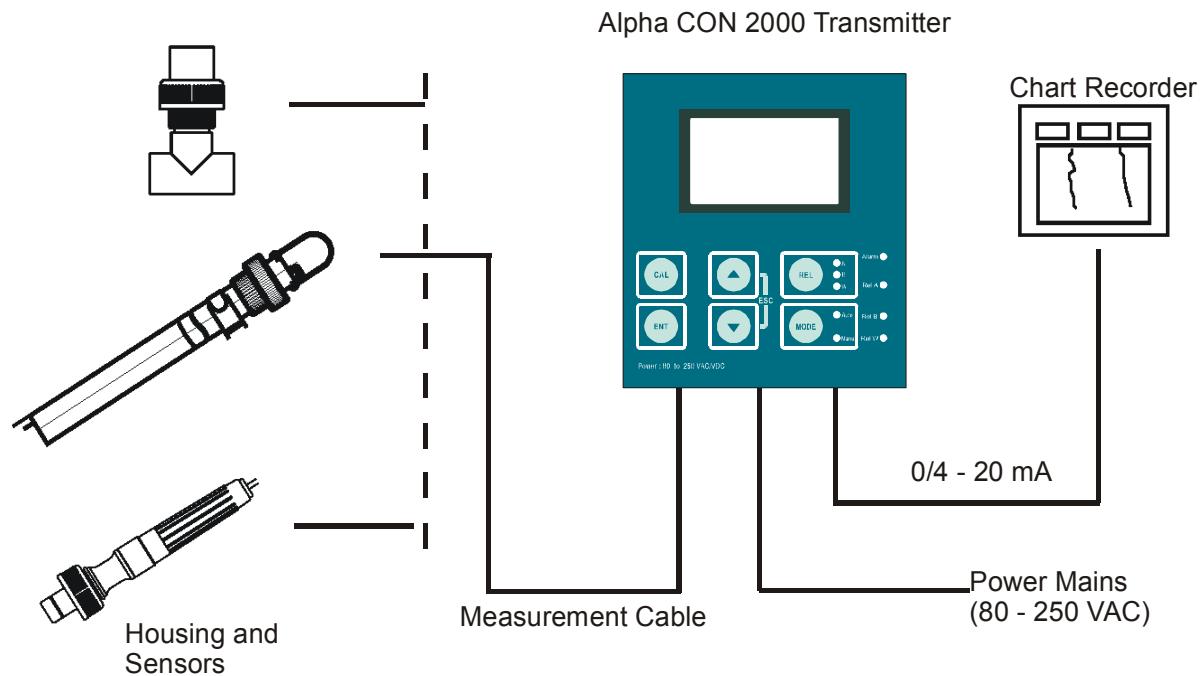
This transmitter has many user-friendly and safety features which include:

- Menu-driven program that simplifies set-up.
- Built-in non-volatile memory to ensure that calibration and other information are not erased if power supply fails.
- Push-button for calibration and sensor offset adjustment from the keypad.
- Automatic temperature compensation (ATC).
- Manual temperature compensation setting without the ATC probe, with independent setting for calibration and process temperature.
- Two galvanically isolated current outputs 0/4...20mA.
- 0 to 2000 seconds time delay adjustment on all relays – minimises false alarms.
- Separately adjustable high and low set-point hysteresis (dead bands) prevent chattering of relays around the set points.
- Three control modes: limit controller, P controller and PI controller (P/PI controller as pulse length or pulse frequency).
- Large dual display LCD for easy reading with clear multiple annunciators, alarm status, operational and error messages.
- Two switching contacts as set-point relays.
- Separate alarm relay alerting you to set point limits exceeded for a certain time and if the Pt100/Pt1000 wires are broken or disconnected during the ATC function.
- Wash relay.
- Hold function to freeze output current (0/4...20mA) and release control relays.
- LED indicators signal control activities to visually monitor transmitter status from a distance.
- Protection against electromagnetic interference. ( Available for panel mount only)
- Back lit and UV light protected LC display.

## 2.2 Measurement and control system

A typical measurement system consists of:

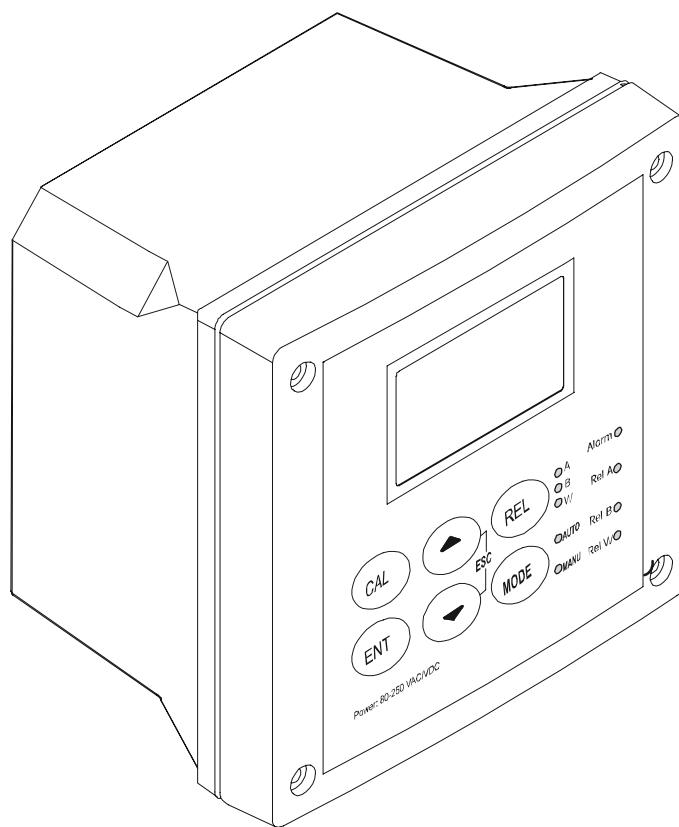
- A conductivity process transmitter
- A conductivity sensor with integrated or separate temperature sensor Pt100/Pt1000.
- An appropriate measurement cable
- An immersion, flow or process assembly
- A final control element such as pump or valve
- A chart recorder



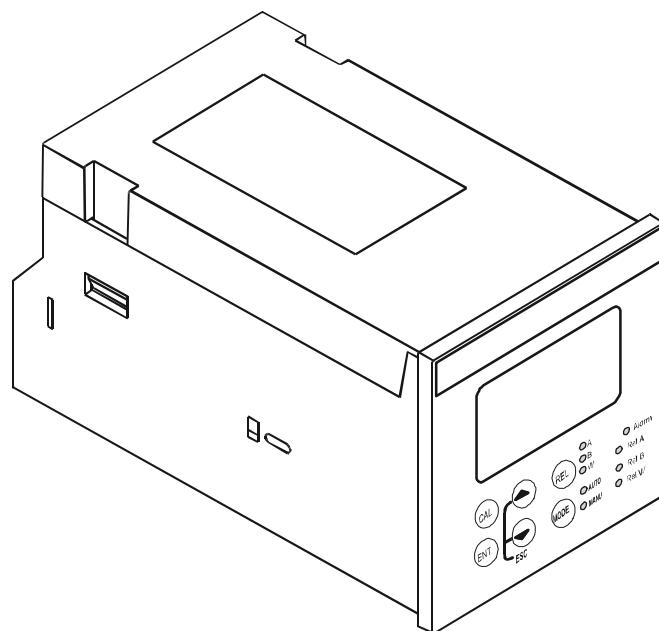
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## 2.3 Unit overview

### Wall mounting version

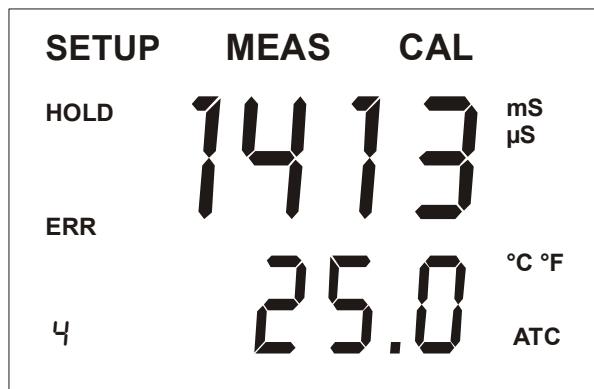


### Panel mounting version



### 2.3.1 Display Overview

The LC display shows two alpha-numerical fields for parameters and measured values as well as various mode and status indicators.



Mode indicators:

MEAS: measurement mode

SETUP: Set-up mode

CAL: Calibration mode

Status indicator:

HOLD: Unit in "HOLD" mode

ATC: Visible in ATC (Automatic Temperature Compensation) mode. Not visible in the Manual Temperature Compensation mode. "ATC" flashes if the temperature probe is faulty in its ATC mode

ERR: Error indicator

4: Measurement range number

### 2.3.2 Key functions

Key	Description
	Enter Calibration mode (requires access code)
	Enter Set-up mode (requires access code) Access sub functions (parameters) within a function group of Set-up mode Confirm (store) set-up parameters and numerical values Start/Confirm calibration in Calibration mode.
	Select function group in the Set-up mode. Set parameters and numerical values (if key is pressed continuously, the setting speed increases). Control the relays in MANUAL relay operation. Returns to "Measurement mode" when both keys are pressed simultaneously.
	Display limit values for SP1 and SP2 and settings for wash contact in AUTO relay operation. Toggle between RELAY A, RELAY B or Wash relay in MANUAL relay operation
	Switch from AUTO to MANUAL relay operation (requires access code)

### 2.3.3 LED indicators

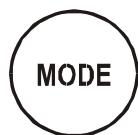
#### Relay indicators



- A
- B
- W

If REL key is pressed the LED (A, B or W) indicates to which Relay (A, B or Wash) the displayed limit values refer.

#### Relay mode indicators



- Auto
- Manu

Auto LED lights if relay operation is set to automatic mode. Manu LED lights if relay operation is set to manual mode.

#### Relay status indicators



This LED lights if limit value is exceeded or the ATC probe fails.



This LED lights green if measured value is within the limit for Relay A or lights red if measured value exceeds limit.



This LED lights green if measured value is within the limit for Relay B or lights red if measured value exceeds limit.



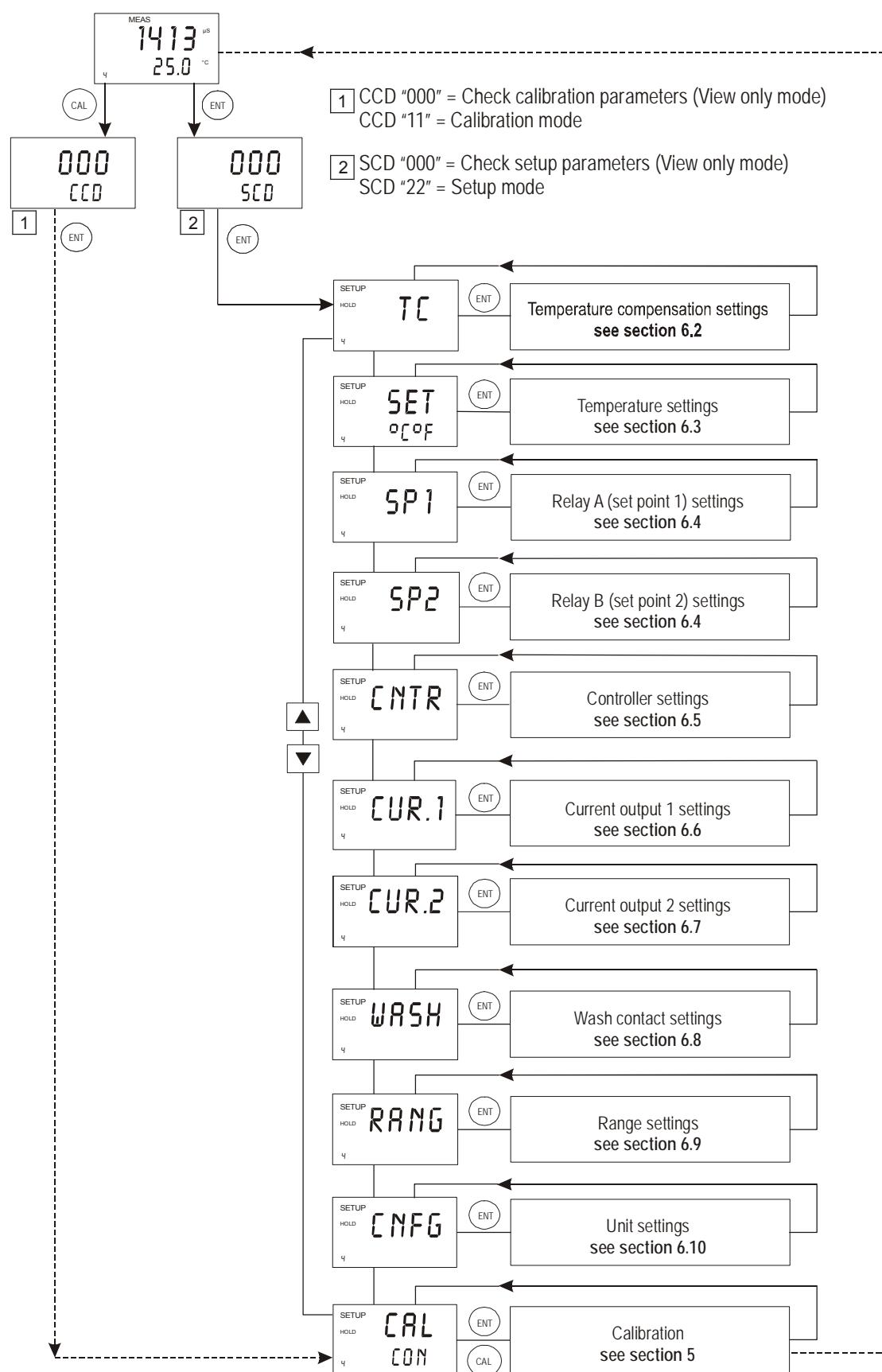
This LED lights if cleaning cycle is on.

### 2.3.4 Security codes

The access to Calibration mode, Setup mode and Manual relay operation mode is protected with security codes. The security codes are set at the factory and cannot be changed by the user. The following security codes are used:

Security code Mode	Description
000	View only mode to view actual settings
11	Calibration mode to start calibration
22	Setup mode to configure parameters
22	Manual relay operation to switch relay operation mode from automatic to manual

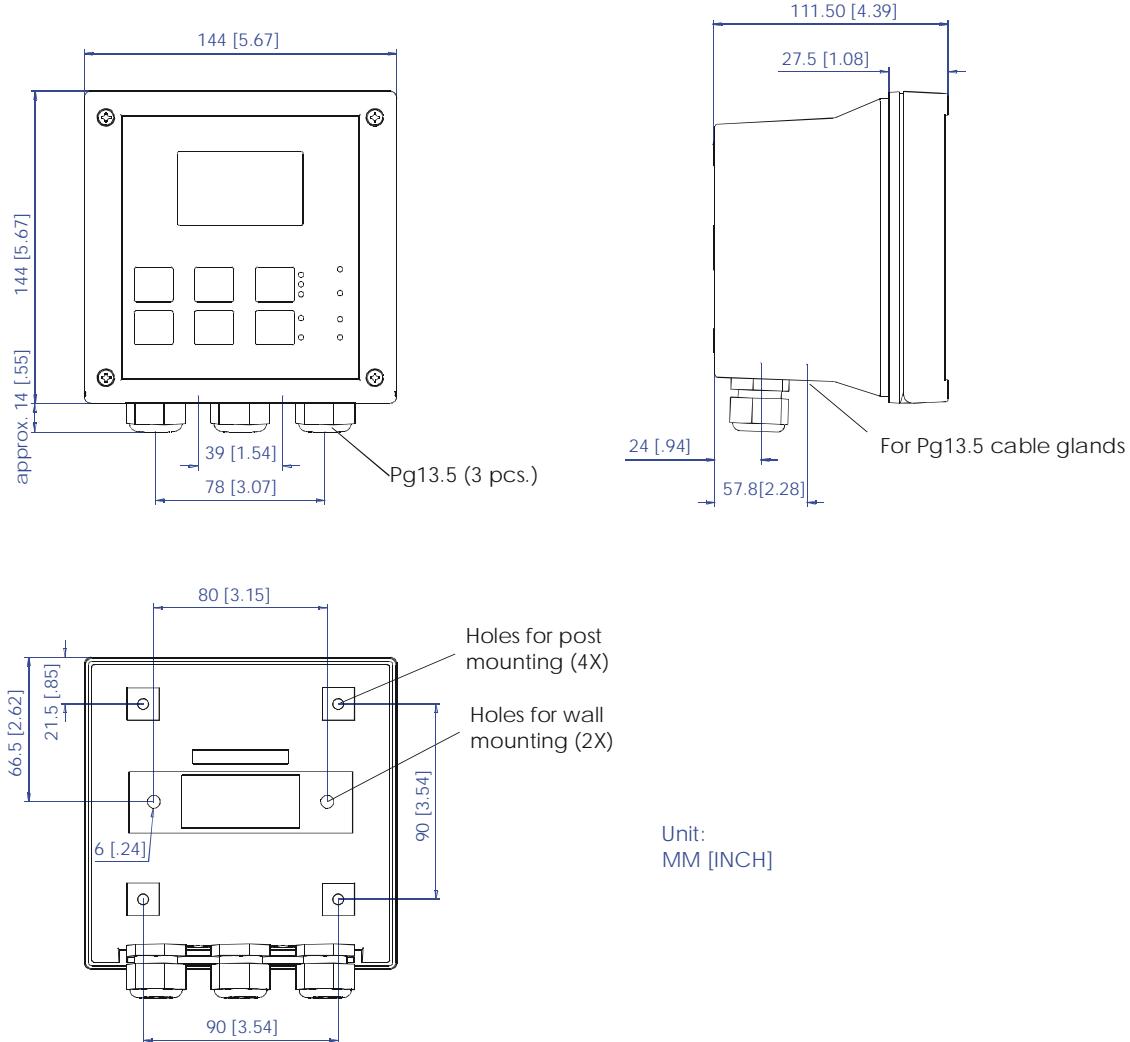
### 2.3.5 Menu overview



### 3 ASSEMBLY AND INSTALLATION

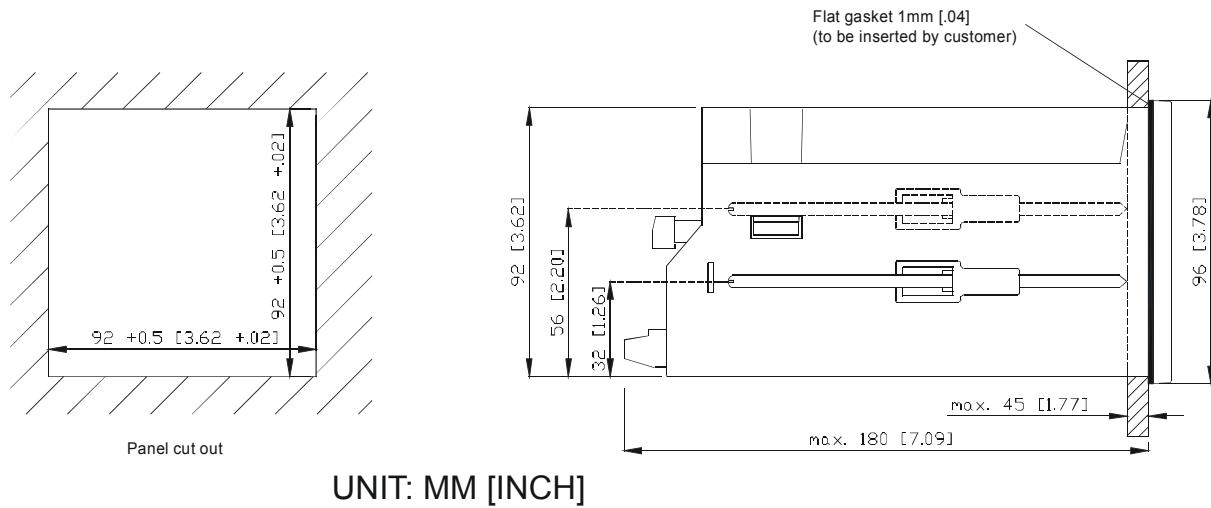
#### 3.1 Mounting the unit

##### Wall mounting version



Transmitter housing for wall mounting: protection class IP 65

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**Panel mounting version**

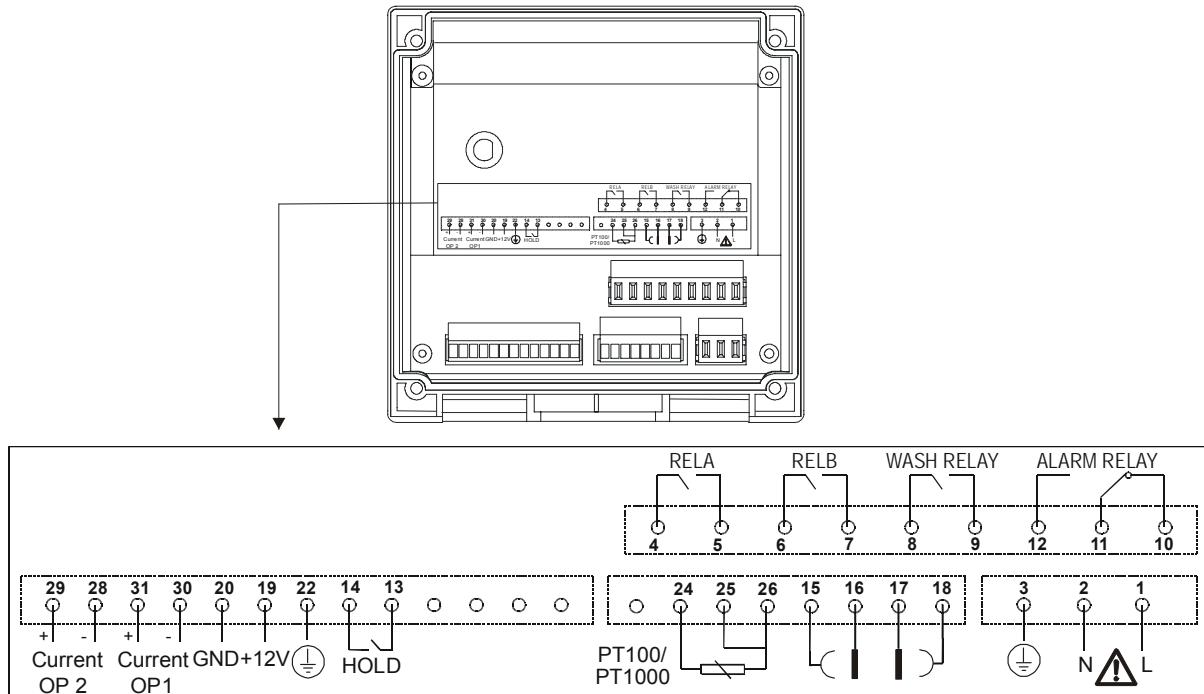
Transmitter housing for panel mounting: protection class IP 54 (front), IP 40 (housing)

### 3.2 Connection Diagram



Caution: Ensure electrical mains are disconnected before proceeding.

#### Connections for wall mounting version



**IMPORTANT:** The Alarm relay functions as an "Active Low" device i.e. it switches OFF under Alarm condition. Therefore the Alarm display device should be connected to the 'NC' contacts of the relay (10 & 11).

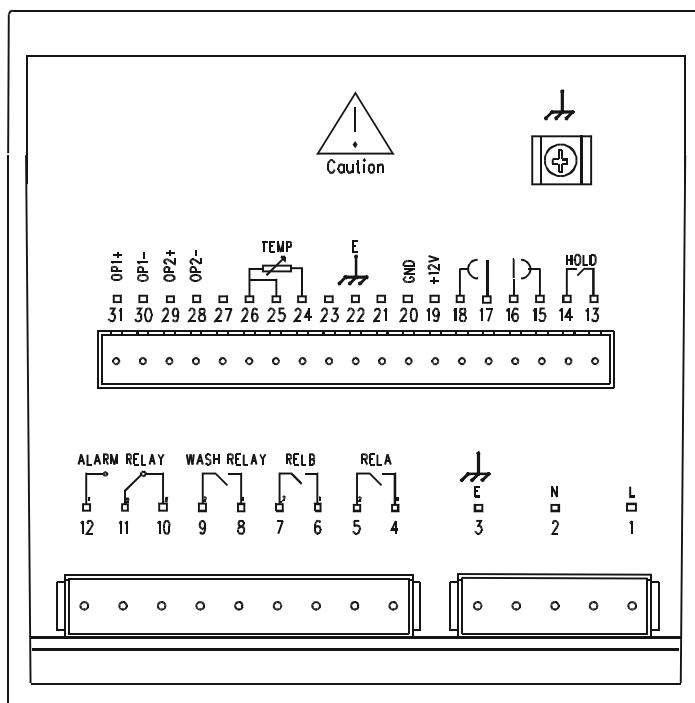


\*\* When using 2 Cell type Conductivity electrode, terminal 15 should be shorted to terminal 16 and terminal 18 should be shorted to terminal 17.



NOTE:

- a) Switch or circuit breaker shall included in the building installation.
- b) It shall be in close proximity to the equipment and within easy reach of the operator.
- c) It shall be marked as the disconnecting device for the equipment.

Connections for panel mounting version

1. AC mains live wire	**17. 4 Cell / 2 Cell type Conductivity Input
2. AC mains neutral wire	18. 4 Cell type Conductivity Input
3. AC mains protective earth wire	19. 12V Power supply
4. Relay A (SP 1)	20. 12V ground
5. Relay A (SP 1)	21. no connection
6. Relay B (SP 2)	22. Earth ground
7. Relay B (SP 2)	23. no connection
8. Wash relay	24. Temperature ground
9. Wash relay	25. Temperature input
10. Alarm relay (NC)	26. Temperature sense (short to terminal 25 if using 2-wire RTD)
11. Alarm relay common	
12. Alarm relay (NO)	27. no connection
13. Hold function	28. 4-20 mA temperature output, -ve terminal
14. Hold function	29. 4-20 mA temperature output, +ve terminal
15. 4 Cell type Conductivity Input	30. 4-20 mA Conductivity output, -ve terminal
**16. 4 Cell / 2 Cell type Conductivity Input	31. 4-20 mA Conductivity output, +ve terminal



IMPORTANT: The Alarm relay functions as an "Active Low" device i.e. it switches OFF under Alarm condition. Therefore the Alarm display device should be connected to the 'NC' contacts of the relay (10 & 11).



\*\* When using 2 Cell type Conductivity electrode, terminal 15 should be shorted to terminal 16 and terminal 18 should be shorted to terminal 17.



## NOTE:

- 1) Switch or circuit breaker shall included in the building installation.
- 2) It shall be in close proximity to the equipment and within easy reach of the operator.
- 3) It shall be marked as the disconnecting device for the equipment.

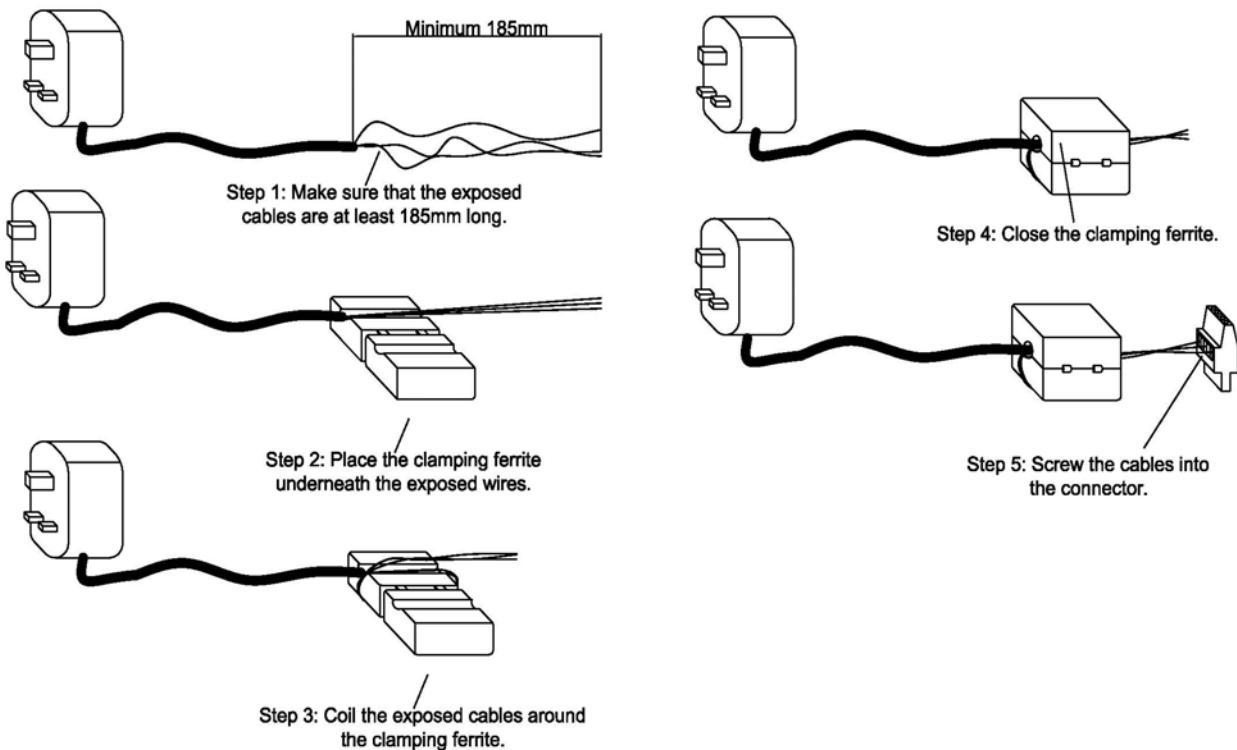


The power cable (L, N & E) need to be connected to the instrument with two turns through Enclosed Ferrite Wurth Electronik 742 712 21 which is supplied as an accessory with the instrument.



It is strongly suggested that the Ferrite element supplied as a standard accessory be installed as described below.

### Clamping Ferrite Assembly Process



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## 4 NORMAL OPERATION

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### 4.1 Measurement mode

When the transmitter is powered on, the display first shows all segments briefly, after which the transmitter automatically enters into the **Measurement mode**.



**Please note:** To guarantee accurate readings the measuring system (transmitter and sensor) must be calibrated.



The mode indicator "MEAS" at the top of the display indicates that the transmitter is in Measurement mode. The upper alpha-numerical display shows the measured conductivity value, while the lower display shows the temperature value.

From Measurement mode you can access **Calibration mode** and **Setup mode** by pressing the CAL key or ENT key followed by the corresponding security code. For detailed information refer to **section 5 "Calibration mode"** or **section 6 "Setup mode"**, respectively.

By pressing the **REL** key in Measurement mode you can view the actual relay set points. By pressing the **MODE** key followed by the corresponding security code in Measurement mode you can switch relay operation mode from automatic to manual.

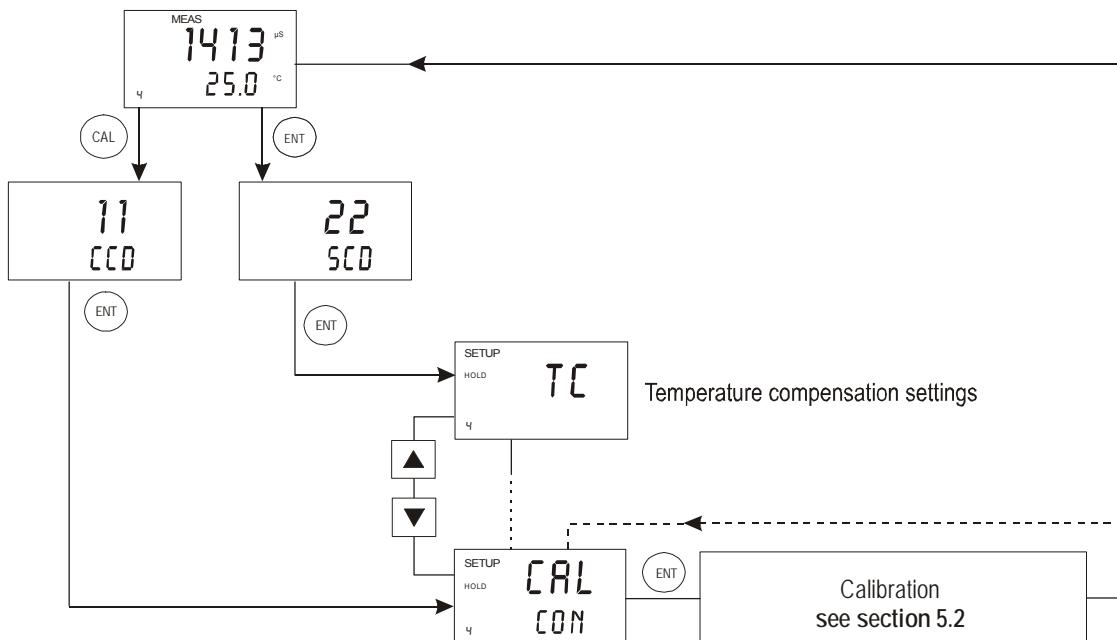
For detailed information refer to **section 7 "Relay Modes"**.

## 5 CALIBRATION MODE

You can access the Calibration mode directly from the Measurement mode by pressing the CAL key and entering the Calibration security code "11". Calibration mode may also be accessed via the Setup mode (see section 6.1).

### 5.1 Entering Calibration mode

#### Enter Calibration Mode



1. While in Measurement mode **press the CAL key** (direct access) or **ENT key** (access via Setup mode).
2. If **CAL key** was pressed: The display prompts you to enter the calibration security code. **Press the ▲ or ▼ key** to set the calibration security code to "11", then **press the ENT key** to confirm the calibration security code.
3. If **ENT key** was pressed: The display prompts you to enter the security code. **Press the ▲ or ▼ key** to set the security code to "22". **Press the ENT key** to confirm the security code, then **press the ▲ or ▼ key** to select the calibration sub-function.

The display shows "CAL CON". To start calibration refer to section 5.2.



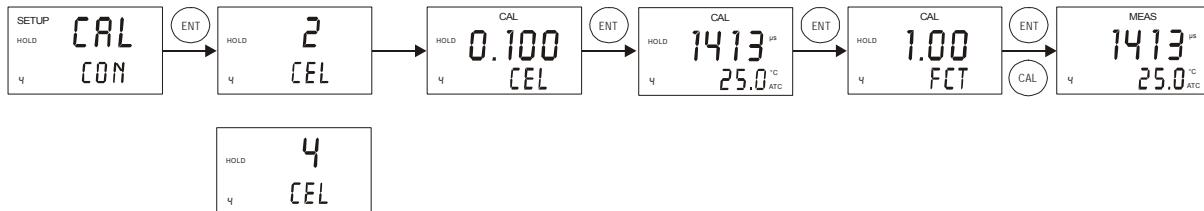
**Note:** to exit Calibration mode at any time **press the ▲ and ▼ keys simultaneously** (escape). The transmitter returns to the Measurement mode and the old calibration values remain active. The calibration security code automatically resets from "11" to "000" after the transmitter returns to Measurement mode.

## 5.2 Calibration

This transmitter features a one-point calibration.



**Note:** The calibration is always carried out in the specific range selected.



1. Enter Calibration mode as described in section 5.1. The display shows "CAL CON".
2. Press the ENT key to start calibration. The display momentarily shows the cell type ("2 CELL" or "4 CELL") to which the transmitter is configured before displaying the last set cell constant (k)



**Important:** If set for a 2 cell operation, make sure that the outer and inner electrode points are shorted on the connector (pins 15 and 16 shorted and pins 17 and 18 shorted).

3. Immerse the sensor in a suitable standard solution, whose value is within the measurement range selected in the transmitter. Agitate the cell in the solution to remove any trapped air-bubbles.



**Note:** The calibration standard must have a value that is 10% to 100% of full scale of the range selected. For example, if the range in the controller is selected to be 2000  $\mu$ S (range 4), then the calibration standard value should be 200  $\mu$ S to 2000  $\mu$ S.

4. Use  $\blacktriangle$  or  $\blacktriangledown$  keys to adjust the cell constant if necessary.
5. Press the ENT key to confirm the selected cell constant. The display then shows the current measured value of the calibration standard solution.
6. Once the reading stabilises press the  $\blacktriangle$  or  $\blacktriangledown$  key to adjust the measured value to that of the standard solution.



**Note:** The acceptable calibration window is  $\pm 40\%$  of the displayed (default) value. If the display is 1000  $\mu$ S, the values to which it can be adjusted is 600 to 1400  $\mu$ S. If there is a calibration error the transmitter displays "ERR" and return to the measurement mode.

7. Press the ENT key to accept the value.
8. The display will then show the calibration factor. This serves as a diagnostic feature to indicate the effectiveness of the electrode which will degrade with time and usage. An effective electrode should be within the calibration factor window of 0.60 to 1.40.
9. Press the ENT key to return to the Measurement mode.

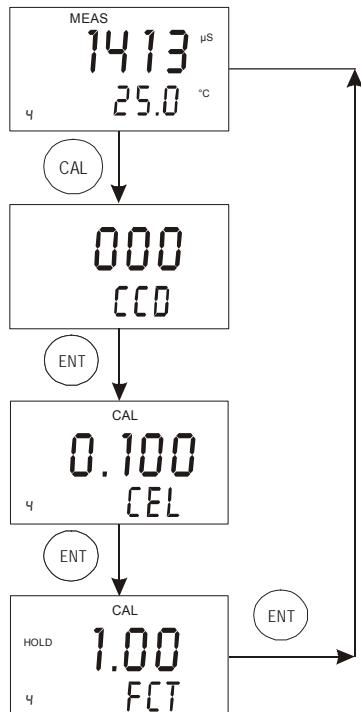


**Note:** If you entered the Calibration mode from the Setup mode, the transmitter will return to the setup menu.



**Note:** When calibrating with manual temperature compensation, the transmitter automatically changes from the preset process temperature to the calibration temperature. After leaving the Calibration mode, the transmitter switches back to the process temperature (for setting the calibration temperature and the process temperature, see section 6.3).

### 5.3 View actual cell constant and calibration factor

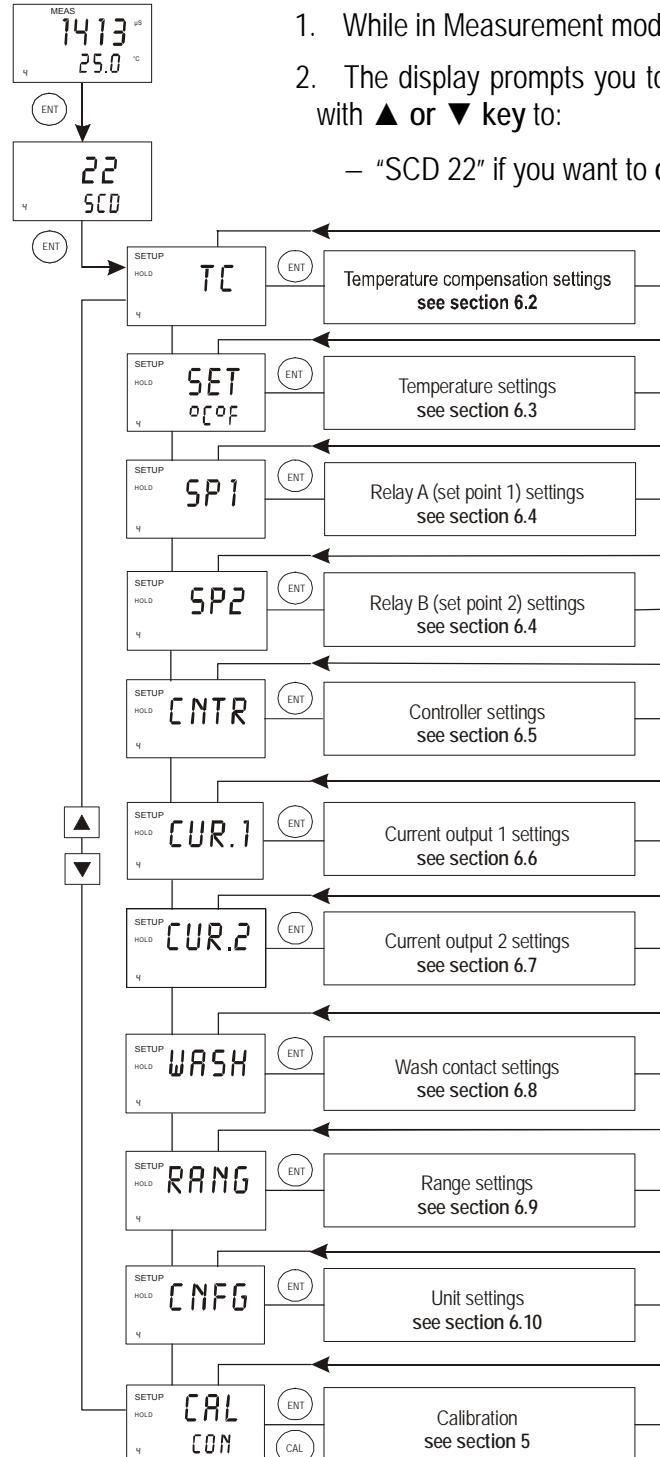


1. While in Measurement mode **press the CAL key**. The display will prompt you to enter a security code. Leave the **security code** at "000" (view only mode).
2. **Press the ENT key**. The display shows the actual cell constant.
3. **Press the ENT key**. The display shows the actual calibration factor. An effective electrode should be within the calibration factor window of 0.60 to 1.40.
4. **Press the ENT key** to return to the Measurement mode.

## 6 SETUP MODE

### 6.1 Enter Setup mode

In the Setup mode the transmitter can be configured to your individual requirements.



1. While in Measurement mode press the ENT key.
2. The display prompts you to enter the security code. Set the security code with **▲** or **▼** key to:
  - "SCD 22" if you want to **change parameter settings**
  - "SCD 000" if you want to view only parameter settings (view only mode)

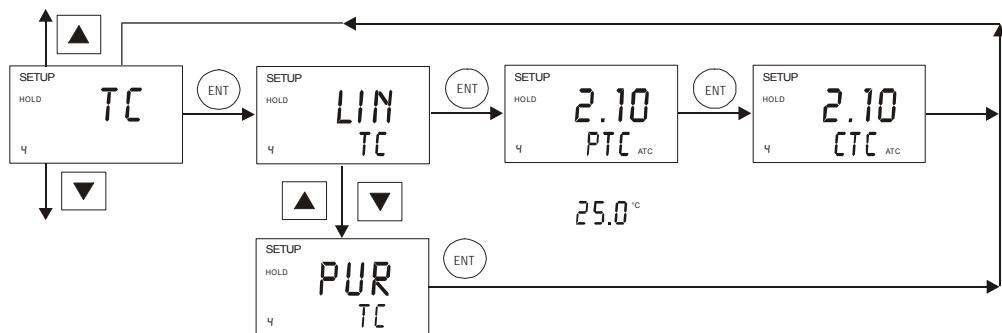
3. Press the ENT key



**Note:** Note: to exit Setup mode at any time press the **▲** and **▼** key simultaneously (escape). The transmitter returns to the Measurement mode.

## 6.2 Temperature compensation (TC) sub-function

This sub-function allows you to select the correct temperature compensation for optimum operations.



1. Select the "TC" sub-function, then press the ENT key.
2. **Selecting type of temperature compensation:** press the ▲ or ▼ key to select the suitable type of temperature compensation:

- PUR TC = Pure water temperature compensation

Use pure water temperature compensation for applications in the pure water or ultra-pure water industries.



**Note:** "PUR TC" should be selected while working with pure water, usually in the 0-2 µS range.

- LIN TC= Linear temperature compensation

Use linear temperature compensation for all other applications.

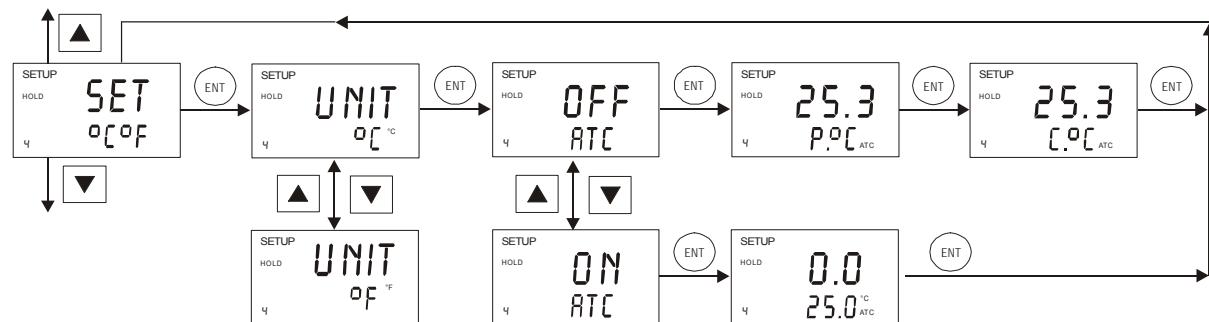
Press the ENT key to confirm your selection.

- If linear temperature compensation was selected (LIN TC):

3. **Selecting the temperature compensation value for process liquid:** press the ▲ or ▼ key to adjust the temperature compensation value (setting range: 0 to 10 %, factory setting: 2.10 %). Press the ENTER key to confirm the temperature compensation value.
4. **Selecting the temperature compensation value for calibration liquid:** press the ▲ or ▼ key to adjust the temperature compensation value (setting range: 0 to 10 %, factory setting: 2.10 %). Press the ENT key to confirm the temperature compensation value.

Continue with additional Setup procedures, or return to the Measurement mode by pressing the ▲ and ▼ key (escape) simultaneously.

### 6.3 Setting temperature (Set °C°F) sub-function



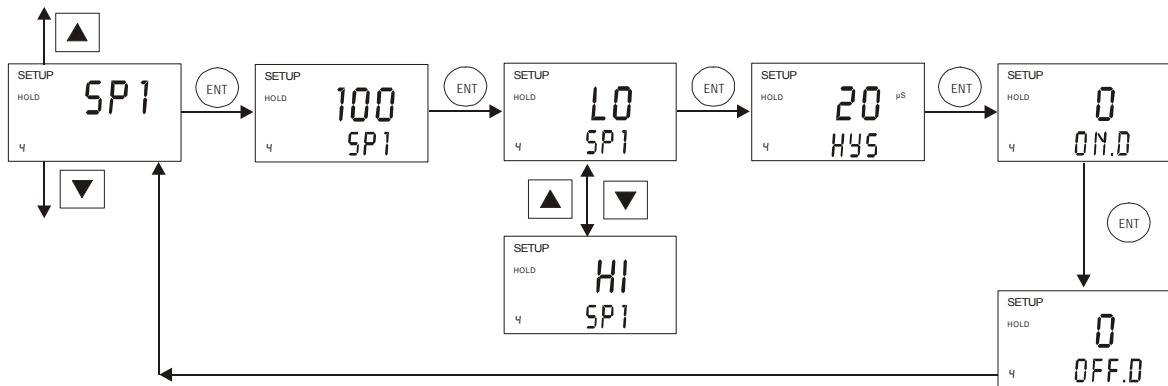
1. Select the "SET °C°F" sub-function, then press the ENT key.
2. Selecting temperature unit: press the ▲ or ▼ key to select the desired temperature unit "°C" or "°F". Press the ENTER key to confirm your selection.
3. Enable/disable ATC mode: press the ▲ or ▼ key to enable (ATC ON) or disable (ATC OFF) automatic temperature compensation. Press the ENT key to confirm your selection.
  - ATC disabled (ATC OFF):

For manual temperature compensation you can set the process and calibration temperatures. This allows calibration at a temperature other than the process temperature. Example: setting a calibration temperature of 25°C lets you calibrate using standard solutions at 25°C, even if your process temperature is different from 25°C.
  - 4. Setting the process temperature: press the ▲ or ▼ key to adjust the process temperature (upper value, setting range: -10.0 to 125.0°C / 14.0 to 257.0 °F). Press the ENT key to confirm process temperature.
  - 5. Setting the calibration temperature: press the ▲ or ▼ key to adjust the calibration temperature (upper value, setting range: -10.0 to 125.0°C / 14.0 to 257.0 °F). Press the ENT key to confirm the calibration temperature.
- ATC enabled (ATC ON):
  - 6. Setting the temperature offset: The display shows the current temperature offset (upper value) and the temperature currently measured (lower value). Compare the current temperature displayed on the transmitter to a thermometer known to be accurate. Note the correct temperature value. Press the ▲ or ▼ key to adjust the lower value. The upper number indicates the offset value. You can offset the temperature by up to ±10°C/±18°F. Press the ENT key to confirm your setting.

Continue with additional Setup procedures, or return to the Measurement mode by pressing the ▲ and ▼ key (escape) simultaneously.

## 6.4 Control Relay A / Relay B (SP1/SP2) sub-function

The SP1 sub-function determines the operating parameters for Relay A; while SP2 defines the operating parameters for Relay B. Since these groups have the same set-up parameters, they are described together.



1. Select the "SP1" (Relay A) or "SP2" (Relay B) sub-function, then press the ENT key.
2. **Setting set point value:** press the ▲ or ▼ key to enter the value for set point 1 (set point 2) at which your controller will activate. Press the ENT key to confirm your setting.
3. **Selecting relay function:** press the ▲ or ▼ key to select the desired relay function ("LO"= low or "HI"= high). Press the ENT key to confirm your selection.



**Note:** Note: This parameter lets you choose the relay function. Select "LO" to activate the relay when the conductivity value undershoots the low set point; select "HI" to activate the relay when the value overshoots the high set point. SP1 and SP2 can be selected as "Lo/Lo", "Lo/Hi", "Hi/Lo", or "Hi/Hi".

4. **Setting a hysteresis value:** press the ▲ or ▼ key to select the desired hysteresis (setting range: 0 to 10% of full scale) for set point 1 (set point 2). Press the ENT key to confirm your setting.



**Note:** Hysteresis prevents rapid contact switching if your value is fluctuating near the set point. Please refer to Appendix 3 for a graphical representation of the hysteresis.

Example: You have set your high set point at 1900  $\mu$ S and your hysteresis value is 20  $\mu$ S. If your measured value overshoots 1900  $\mu$ S, the controller's relay activates. The actions of the external device will cause the solution's conductivity to drop. The relay will deactivate, when the conductivity value drops below 1880  $\mu$ S.

5. **Setting the on-delay time lag:** press the **▲** or **▼** key to enter the on-delay time for set point 1 (set point 2). The controller will delay activation of the relay for the number of seconds (0 to 2000 seconds) you select. **Press the ENT key** to confirm your setting.



**Note:** You can set a time delay for each relay, which stops the relay from switching on the moment the set point is exceeded. This controller lets you set a 0 to 2000 seconds time delay before your relay activates.

6. **Setting the off-delay time lag:** press the **▲** or **▼** key to enter the off-delay time for set point 1 (set point 2). Your controller will delay deactivation of the relay for the number of seconds (0 to 2000 seconds) you select. **Press the ENT key** to confirm your setting.

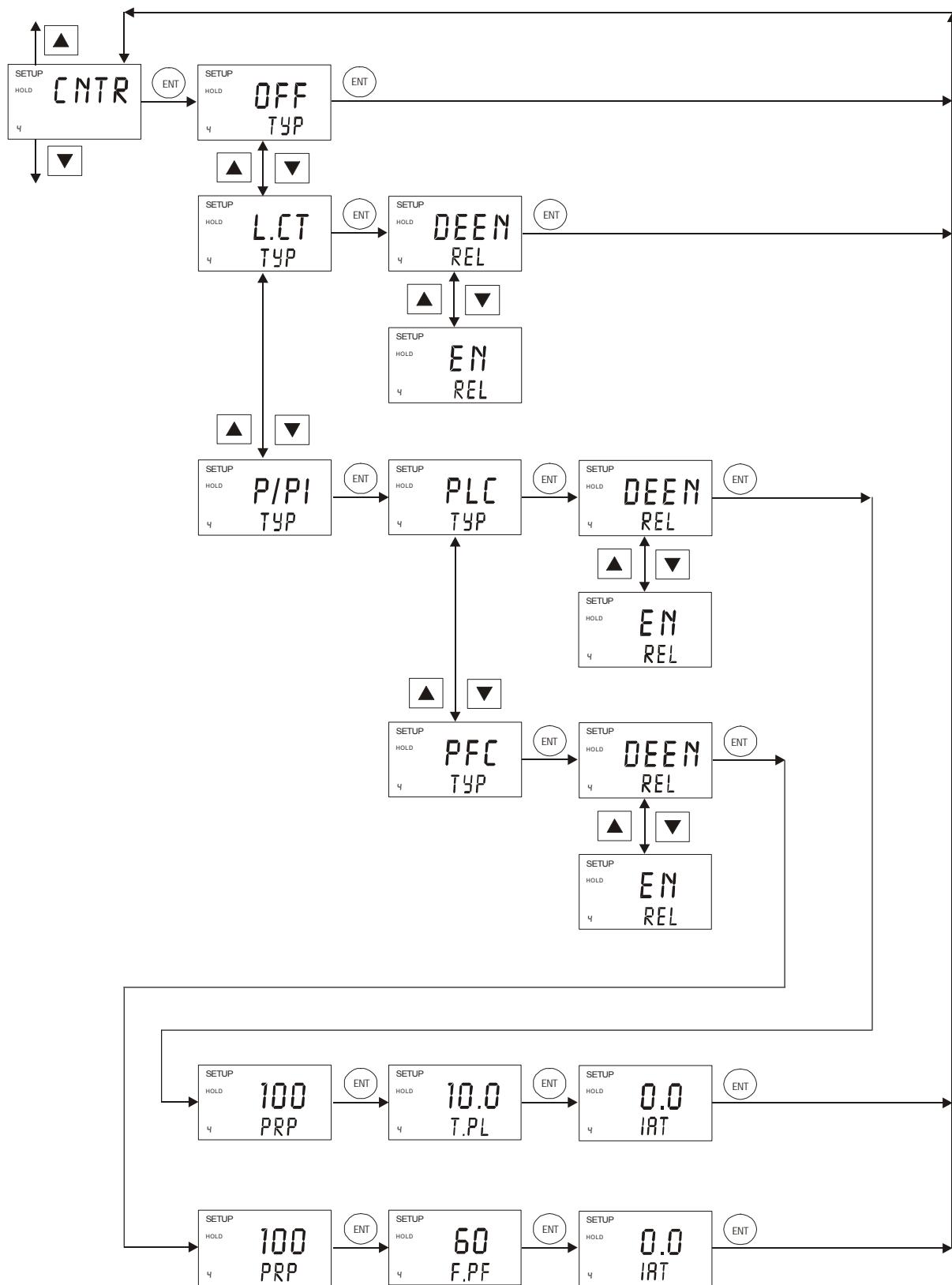


**Note:** You can set a time delay for each relay, which stops the relay from switching off the moment the value reaches the set point and hysteresis. This controller lets you set a 0 to 2000 seconds time delay before your relay deactivates.

Continue with Setup mode procedures, or return to Measurement mode by pressing the **▲** and **▼** keys simultaneously (escape).

## 6.5 Controller (CNTR) sub-function

The CNTR sub-function determines the controller's parameters.



---

1. Select the "CNTR" subfunction, then press the ENT key.
2. Selecting the controller type: press the ▲ or ▼ key to select the suitable controller type:
  - OFF = controller off  
Use control Off to operate controller as a monitor only or to prevent relays from switching.
  - L.CT = limit value control (on/off control).  
Use limit control with pumps or valves for fast response
  - P/PI = proportional/integral control  
Use proportional control to operate your pumps smoothly or for precise control of proportioning valves. Use PI controller to eliminate steady state error.



**Note:** please refer to Appendix 4 for detailed information on controller settings.

Press the ENT key to confirm your selection.

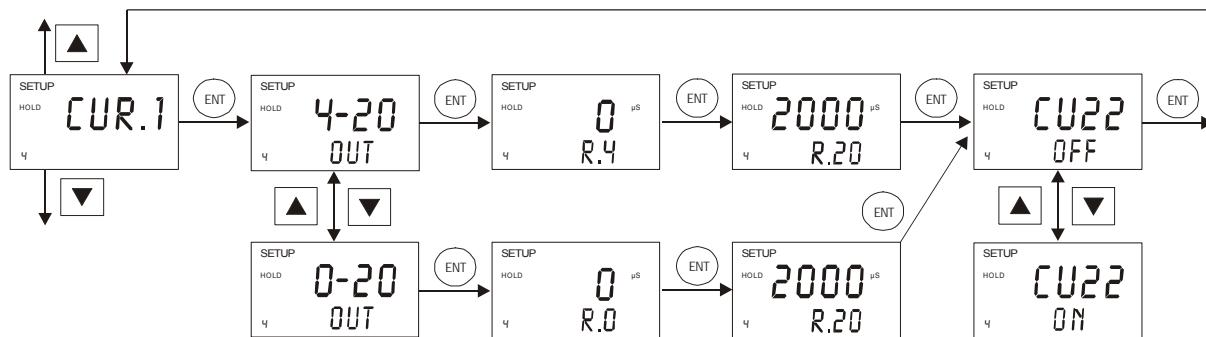
- If the controller is set to limit value control (L.CT):
3. Selecting the relay status under Non-Alarm condition: press the ▲ or ▼ key to choose the desired relay status (de-energised = "DEEN" or energised = "EN"). Press the ENT key to confirm your selection.
- If the controller is set to proportional control (P/PI):
4. Selecting the proportional controller type: press the ▲ or ▼ key to select the suitable controller type ("PLC" = pulse length control, "PFC" = pulse frequency control). Press the ENT key to confirm your selection.
- If the proportional controller type is set to pulse length control (PLC):
5. Selecting the relay status under Non-Alarm condition: press the ▲ or ▼ key to choose the desired relay status (de-energised = "DEEN" or energised = "EN"). Press the ENT key to confirm your selection.
6. Setting the proportional range: Press the ▲ or ▼ key to set the proportional range (setting range: 10 to 500%). Press the ENT key to confirm your setting.
7. Setting the pulse length: Press the ▲ or ▼ key to set the pulse length (setting range: 0.5 to 20 seconds). Press the ENT key to confirm your setting.
8. Setting the integral action time: Press the ▲ or ▼ key to set the integral action time (setting range: 0.0 to 999.9 minutes). Press the ENT key to confirm your setting.

- If the proportional controller type is set to **pulse frequency control (PFC)**:
- 9. **Selecting the relay status under Non-Alarm condition:** press the **▲** or **▼** key to choose the desired relay status (de-energised = "DEEN" or energised = "EN"). Press the **ENT** key to confirm your selection.
- 10. **Setting the proportional range:** press the **▲** or **▼** key to set the proportional range (setting range: 10 to 500%). Press the **ENT** key to confirm your setting.
- 11. **Setting the pulse frequency:** press the **▲** or **▼** key to set the pulse frequency (setting range: 60 to 120 pulses per minute). Press the **ENT** key to confirm your setting.
- 12. **Setting the integral action time:** press the **▲** or **▼** key to set the integral action time (setting range: 0.0 to 999.9 minutes). Press the **ENT** key to confirm your setting.

Continue with Setup mode procedures, or return to Measurement mode by pressing the **▲** and **▼** keys simultaneously (escape).

## 6.6 Current Output 1 sub-function

In this subfunction you set the current output range of the transmitter for conductivity values.



1. Select the "CUR.1" subfunction, then **press the ENT key**.
2. **Selecting the output type:** press the **▲** or **▼** key to select the desired output type: 0-20 mA or 4-20 mA. Press the ENT key to confirm your selection.
3. **Setting the conductivity value at which the transmitter output will be 4 mA (or 0 mA):** press the **▲** or **▼** key to set the conductivity value to be equivalent to 4 mA or 0 mA, respectively. Press the ENT key to confirm your setting.
4. **Setting the conductivity value at which the transmitter output will be 20 mA:** press the **▲** or **▼** key to set the conductivity value to be equivalent to 20 mA. Press the ENT key to confirm your setting.
5. **Selecting out of range current:** Press the **▲** or **▼** key to switch "CU22" on or off. If "CU22" is on, the output signal will jump to 22 mA when the measured conductivity value is below or above the values set in points 3 & 4 above. Press the ENT key to confirm your setting.

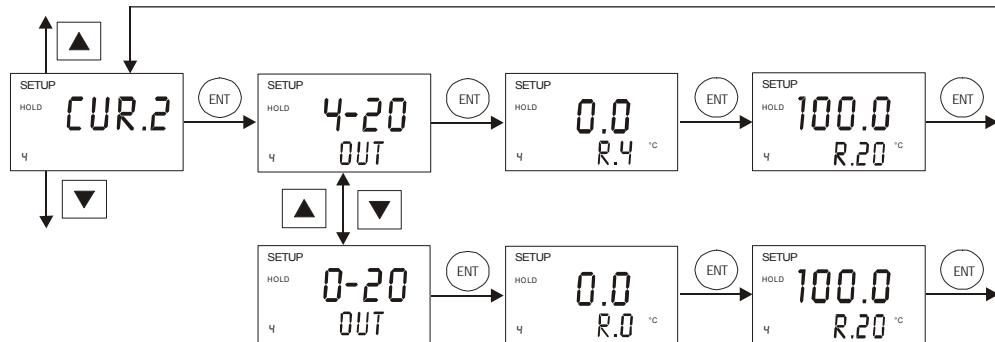


**Note:** the "CU22" setting (on/off) of current output 1 applies to current output 2 as well.

Continue with Setup mode procedures, or return to Measurement mode by pressing the **▲** and **▼** keys simultaneously (escape).

## 6.7 Current Output 2 sub-function

In this sub-function you set the current output range of the transmitter for temperature values.

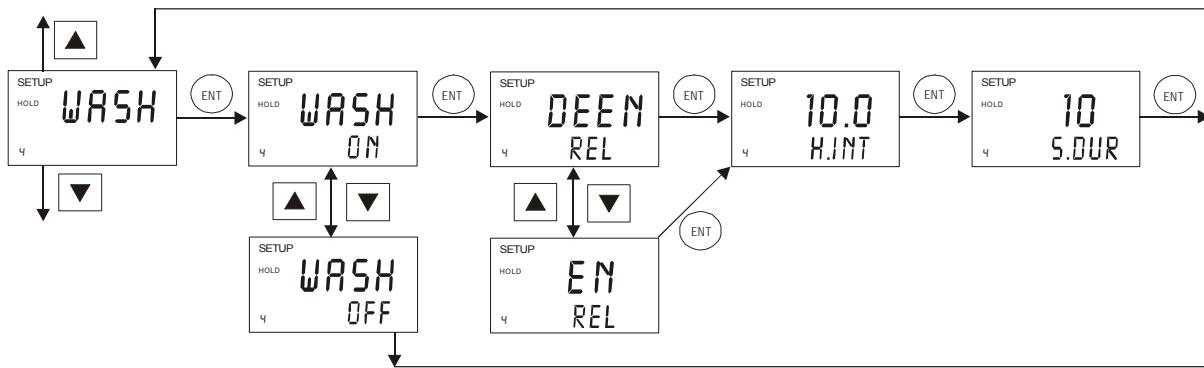


1. Select the "CUR.2" sub-function, then press the ENT key.
2. **Selecting the output type:** press the **▲** or **▼** key to select the desired output type: 0-20 mA or 4-20 mA. Press the ENT key to confirm your selection.
3. **Setting the temperature value at which the transmitter output will be 4 mA (or 0 mA):** press the **▲** or **▼** key to set the temperature value (setting range: -10.0 to 115.0 °C or 14 to 237 °F) to be equivalent to 4 mA (or 0 mA). Press the ENT key to confirm your setting.
4. **Setting the temperature value at which the transmitter output will be 20 mA:** press the **▲** or **▼** key to set the temperature value (setting range: 0.0 to 125.0 °C or 32 to 257 °F) to be equivalent to 20 mA. Press the ENT key to confirm your setting.

Continue with Setup mode procedures, or return to Measurement mode by pressing the **▲** and **▼** keys simultaneously (escape).

## 6.8 Wash relay (WASH) sub-function

In this sub-function you set the parameters for the wash relay.



1. Select the "WASH" sub-function, then press the ENT key.
2. Enabling/disabling wash function: press the ▲ or ▼ key to enable (WASH ON) or disable (WASH OFF) wash function. Press the ENT key to confirm your selection.
3. Selecting the relay status condition: press the ▲ or ▼ key to choose desired relay status (de-energised = "DEEN" or energised = "EN"). Press the ENT key to confirm your selection.
4. Setting the wash interval in hours: Press the ▲ or ▼ key to set the desired wash interval (setting range: 0.1 to 199.9 hours). Press the ENT key to confirm your setting.
5. Setting the wash duration in seconds: Press the ▲ or ▼ key to set the desired wash duration (setting range: 1 to 1999 seconds). Press the ENT key to confirm your setting.

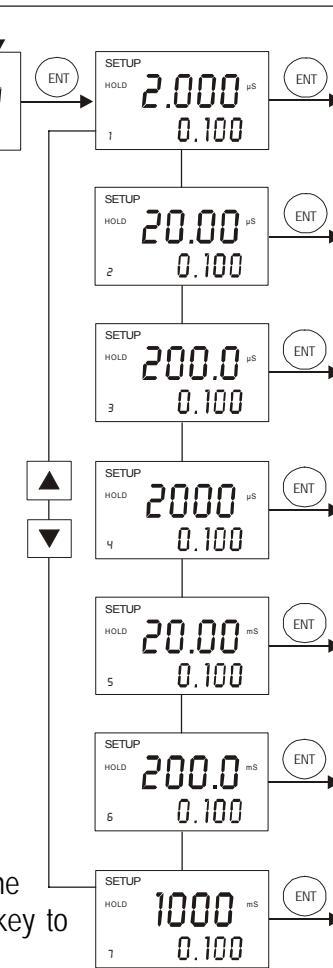


**Note:** During wash cycle the transmitter is set to HOLD. For safety reasons, the HOLD function is activated 5 seconds prior and deactivated 10 seconds after the wash cycle.

Continue with Setup mode procedures, or return to Measurement mode by pressing the ▲ and ▼ keys simultaneously (escape).

## 6.9 Measuring range selection (RANG) sub-function

In this sub-function you select the measuring range.



1. Select the "RANG" sub-function, then press the ENT key.
2. Selecting the measuring range: The display shows the currently selected measuring range. Press the ▲ or ▼ key to select the requested measuring range.

### Measuring ranges:

No.	Measuring range	Resolution
1	0.000 to 2.000 $\mu\text{S}/\text{cm}$	0.001 $\mu\text{S}/\text{cm}$
2	0.00 to 20.00 $\mu\text{S}/\text{cm}$	0.01 $\mu\text{S}/\text{cm}$
3	0.0 to 200.0 $\mu\text{S}/\text{cm}$	0.1 $\mu\text{S}/\text{cm}$
4	0 to 2000 $\mu\text{S}/\text{cm}$	1 $\mu\text{S}/\text{cm}$
5	0.00 to 20.00 $\text{mS}/\text{cm}$	0.01 $\text{mS}/\text{cm}$
6	0.0 to 200.0 $\text{mS}/\text{cm}$	0.1 $\text{mS}/\text{cm}$
7	0 to 1000 $\text{mS}/\text{cm}$	1 $\text{mS}/\text{cm}$

### Relative accuracy:

±1 % of full scale reading (±2 % >500  $\text{mS}/\text{cm}$ )

### System accuracy:

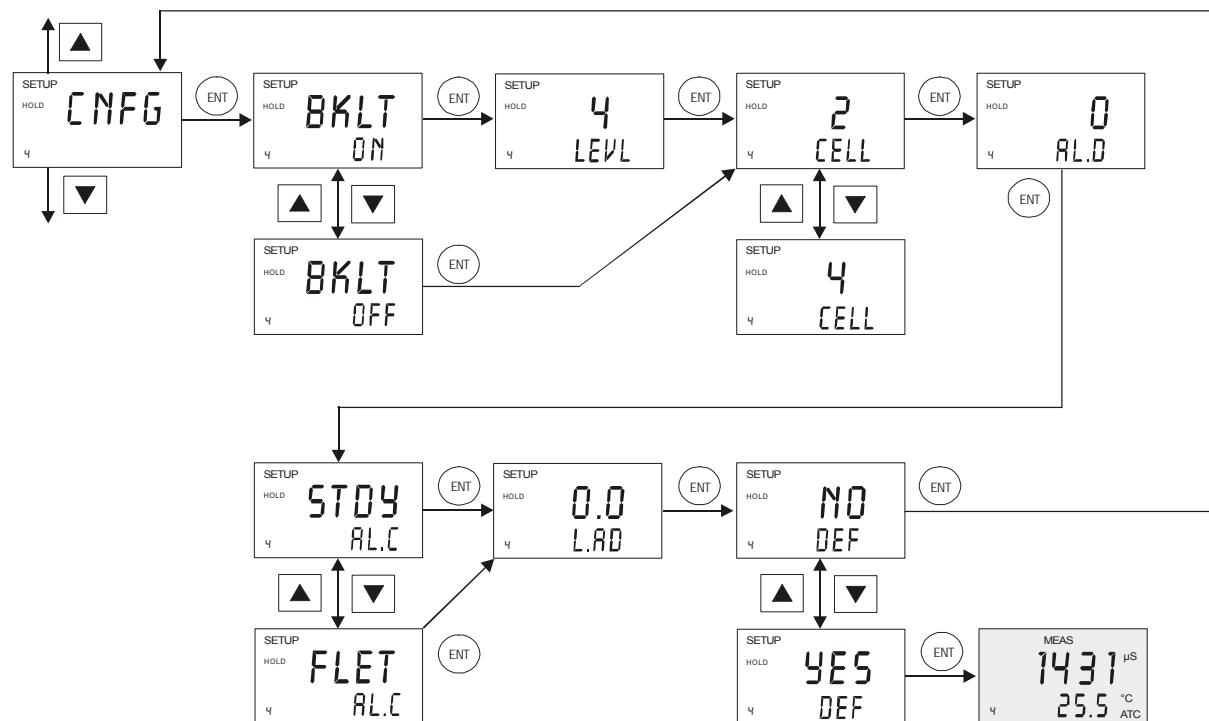
The effective measuring range and the total system accuracy depend on the sensor used with the transmitter. Please refer to the respective sensor documentation.

Press the ENT key to confirm your selection.

Continue with Setup mode procedures, or return to Measurement mode by pressing the ▲ and ▼ keys simultaneously (escape).

## 6.10 Configuration (CNFG) sub-function

In this sub-function you configure the transmitter to suit your requirements.



1. Select the "CNFG" subfunction, then press the ENT key.
2. Enabling/disabling the display backlight: press the ▲ or ▼ key to switch display backlight on (BKLT ON) or off (BKLT OFF). Press the ENT key to confirm your selection.
3. Setting the backlight intensity (appears only if backlight is on): press the ▲ or ▼ key to set backlight intensity (setting range: minimum 1 to maximum 4). Press the ENT key to confirm your setting.
4. Selecting the cell type: press the ▲ or ▼ key to select "2-cell" or "4-cell" type. Press the ENT key to confirm your selection.
5. Setting the alarm delay time in seconds: press the ▲ or ▼ key to set the alarm delay time (setting range: 0 to 2000 seconds). Press the ENT key to confirm your setting.



**Note:** With this parameter you set the delay before the alarm relay activates when the set point has been exceeded.

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6. Selecting the alarm contact type: press the **▲** or **▼** key to select the alarm contact type:

- “STDY” = steady contact
- “FLET” = fleeting (single pulse) contact

Press the **ENT** key to confirm your selection.



**Note:** With this parameter you select whether the alarm contact will operate as a steady contact or a fleeting (single pulse) contact. Pulse contact closing time is 1 second.

7. Setting the line resistance: press the **▲** or **▼** key to set the line resistance of the sensor cable connected to the transmitter. Press the **ENT** key to confirm your setting.



**Note:** This feature will be available only if “2 cell” is selected.

8. Resetting the transmitter settings to factory defaults: The display shows “NO DEF”. Press the **▲** or **▼** key to select:

- “NO DEF” = keeps old values active, when confirmed with **ENT** key
- “YES DEF” = resets all settings to factory defaults, when confirmed with **ENT** key

Press the **ENT** key. The selected function will be executed and the transmitter returns automatically to the Measurement mode.

Continue with Setup mode procedures, or return to Measurement mode by pressing the **▲** and **▼** keys simultaneously (escape).

## 6.11 Calibration (CAL) sub-function

The calibration procedure in Setup mode is identical to the procedure in the Calibration mode (see section 5). The only difference is that the transmitter remains in Setup mode (instead of Measurement mode) after calibration is completed.

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## 7 RELAY MODES

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You can control devices connected to Relay A, Relay B or wash relay via the front panel of the transmitter. In Automatic mode, the transmitter's set point values activate the relays. In Manual mode, you can manually turn "on" and "off" the control devices connected to the relays.

### 7.1 View relay set points

To view relay set points, the relay mode must be set to automatic (standard mode after switch-on, relay mode LED "Auto" lights).

While in Measurement mode press the REL key.



The display shows the set point value for Relay A and LED "A" lights.



After two seconds the display shows the set point value for Relay B and LED "B" lights).



After two seconds the display shows the status of the Wash relay and LED "W" lights. If Wash relay is "off" the display shows "WASH OFF". If Wash relay is "on" the wash interval time and wash duration is displayed.

After an additional two seconds the transmitter will return to Measurement mode.

## 7.2 Manual relay mode

In manual relay mode, you can manually turn "on" and "off" the control devices connected to Relay A, Relay B or Wash relay.

1. While in Measurement mode **press the MODE key**.
2. The display prompts you to enter the security code. Press the **▲** or **▼** key to set security code to "22".
3. **Press the ENT key**. The Manual relay mode is activated and the relay mode LED "Manu" lights.



**Note:** Pressing ENT key at a value other than "22" will cause the transmitter to revert to Measurement mode, and the relays will remain in automatic mode.

4. Press the **REL key** to select either Relay A, Relay B or Wash relay. The corresponding LED (A, B, or W) turns to red.

The manual control options now available depend on the control type (limit, pulse frequency, or pulse length) you selected and set in section 6.5.



If you selected Limit control: The display shows the current measured value and "OFF" or "ON" depending on the relay status of the currently selected relay.



If you selected Pulse length control: The display shows the current measured value (upper value) and the on time as a percentage of the current duration set in the CNTR sub-function in setup mode (lower value).



If you selected Pulse frequency control: The display shows the current measured value (upper value) and the pulse frequency (lower value).

5. **Press the ▲ or ▼ key** to change the Relay on/off status, pulse length, pulse frequency or wash function. The relay status LED at the right of the transmitter will also change from Red to Green.



**Note:** Note: If you wish to manually change the status of relays, press the **REL key** at this point and repeat step 5 for the other two relays. The relay(s) will remain under manual control while you are setting a relay.

6. **Press the MODE key** to return to Measurement mode. The relays are now back to automatic control.

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## 8 TECHNICAL SPECIFICATIONS

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### 8.1 General specifications

Conductivity		
Measuring range No	Measuring range	Resolution
1	0.000 - 2.000 $\mu$ S/cm	0.001 $\mu$ S/cm
2	0.00 - 20.00 $\mu$ S/cm	0.01 $\mu$ S/cm
3	0.0 - 200.0 $\mu$ S/cm	0.1 $\mu$ S/cm
4	0- 2000 $\mu$ S/cm	1 $\mu$ S/cm
5	0.00 - 20.00 mS/cm	0.01 mS/cm
6	0.0 - 200.0 mS/cm	0.1 mS/cm
7	0 - 1000 mS/cm	1 mS/cm
Relative accuracy	$\pm$ 1% of full scale reading ( $\pm$ 2 % >500 mS/cm)	
System accuracy	The effective measuring range and the total system accuracy depend on the sensor used with the transmitter. Please refer to the respective sensor documentation.	
Temperature	-10.0 to + 125.0 °C (14.0 to 257.0 °F)	
Resolution	0.1 °C / °F	
Relative Accuracy	$\pm$ 0.5 °C ( $\pm$ 1.0 °F)	
Sensor	Pt100 /Pt1000 (jumper selectable)	
Temperature Compensation	Auto / manual (reference at 25 °C)	

### Set-point and Controller Functions

Function (switchable)	limit control P/PI control (pulse length/pulse frequency)
Integral time	0 to 999.9 minutes
Adjustable period with pulse length controller	0.5 to 20 sec.
Adjustable period with pulse frequency controller	60 to 120 pulses/min
Pickup / Dropout delay	0 to 2000 seconds
Wash cycle	0.1 to 199.9 hours
Wash duration	1 to 1999 seconds
Switching conductivity hysteresis	0 to 10 % of full scale
Contact outputs, controller	1 SPDT, 3 SPST relays
Switching voltage	max. 250 VAC
Switching current	max. 3A
Switching power	max. 600 VA

**Alarm Functions**

Function (switchable)	Latching / pulse
Pickup delay	0 to 2000 seconds
Switching voltage	Max. 250 VAC
Switching current	Max. 3A
Switching power	Max. 600 VA

**Display**

LCD	UV coat, backlit 14 segments display with symbols for status information
Backlight	On/Off selectable with four level of brightness control

**Electromagnetic Compliance (EMC) Specifications**

Emitted Interference	EN 61 326
Immunity to Interference	EN 61 326

**Environmental Conditions**

Ambient temperature operating range	0 to 40 °C
Maximum Relative humidity	80% up to 31°C decreasing linearly to 50% at 40°C

**Power Supply**

Input	80 to 250 VAC/DC 50/60 Hz Approx. 10VA
Main Fuse	250 mA anti-surge, S504 BUSSMANN
Pollution Degree	2
Transient Overvoltage category	II

**8.2 Specifications for wall mount version****Electrical Data and Connections**

Signal Output	Two 0/4 to 20 mA outputs for conductivity and temperature, galvanically isolated.
Load	Max. 600 Ω
Conductivity input	Screw terminal
Connection terminal	3-pin, 8-pin, 9-pin and 13-pin terminal blocks

## Mechanical Specifications

Dimensions	144 x 144 x 111.5 mm (5.67 x 5.67 x 4.39 inch)
Weight	950 g
Material	PBT
Insulation	NEMA 4X, IP 65

## 8.3 Specifications for panel mount version

### Electrical Data and Connections

Signal Output	Two 0/4 to 20 mA outputs for conductivity and temperature, galvanically isolated.
Load	Max. 600 $\Omega$
Conductivity input	Screw terminal
Connection terminal	5-pin, 9-pin, and 19-pin terminal blocks

## Mechanical Specifications

Dimensions	175 x 96 x 96 mm (6.89 x 3.78 x 3.78 inch)
Weight	700 g
Material	ABS
Insulation	IP 54 (front) / IP 40 (housing)

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## 9 ACCESSORIES

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### 9.1 Replacement Unit

Product Description	Eutech Instruments Order Code
alpha CON 2000 Controller / Transmitter, wall mount version	EC-CONCTP2000W
alpha CON 2000 Controller / Transmitter, panel mount version	EC-CONCTP2000P

### 9.2 Assembly Accessories

Product Description	Eutech Instruments Order Code
Conductivity 2 Cell type probe, up to 20 $\mu$ S; Cell constant, K=0.01 with integrated Pt 100, Material SS316 and 25ft cable (open-ended)	EC-CS10-0-01S
Conductivity 2 Cell type probe, up to 20 $\mu$ S; Cell constant, K=0.01 with integrated Pt 100, Material Titanium and 25ft cable (open-ended)	EC-CS10-0-01T
Conductivity 2 Cell type probe, 0.1 - 200 $\mu$ S; Cell constant, K=0.1 with integrated Pt 100, Material SS316 and 25ft cable (open-ended)	EC-CS10-0-1S
Conductivity 2 Cell type probe, up to 200 mS; Cell constant, K=1.0 with integrated Pt 100, Material SS316 and 25ft cable (open-ended)	EC-CS10-1-0S
Conductivity 4 Cell type probe with integrated 3 wire PT100, 30" cable and 3/4 " NPT	EC91346S

Note: Please contact your authorised distributor or dealer for the prices of extension measuring cables and other accessories like tee joints, electrode assembly, and calibration solutions.

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## 10 GENERAL INFORMATION

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### 10.1 Warranty

Eutech Instruments supplies this product with a warranty of one year to be free from significant deviations in material and workmanship from the date of purchase. If repair is necessary and not the result of abuse or misuse within the warranty period, please return by freight pre-paid and amendment will be made without any charge. Eutech Instruments' Customer Service Dept. will determine if the product problem is due to deviations or customer abuse. Out-of-warranty products will be repaired on an exchange basis at cost.

### 10.2 Packaging / Scope of delivery

The instrument is packaged in a corrugated box with an instruction manual and the following accessories:

#### Wall mount version:

- Plug, nylon, black, 2 pcs
- PG13.5, cable gland, 3 pcs
- Connectors, one each of 3 way (5.08 mm), 9 way (5.08mm), 13 way (3.5mm), 8 way (3.5mm)

#### Panel mount version:

- Rubber gasket, 1pc
- Catch, 2pcs
- Rod, thread, 2 pcs
- Connector, one each of 19 way (3.5 mm), 5 way (5.08 mm) and 9way (5.08 mm)

### 10.3 Return of goods

Before returning goods for any reason whatsoever, Customer Service Dept. have to be informed in advance. Items must be carefully packed to prevent damage during shipment, and insured against possible damage or loss. Eutech Instruments will not be responsible for any damage resulting from careless or insufficient packing.

Warning: Shipping damage as a result of inadequate packaging is the user's/distributor's responsibility, whoever applicable. Please follow the guidelines below before shipment.

### 10.4 Guidelines for returning unit for repair

Use the original packaging material if possible when shipping the unit for repair. Otherwise wrap it with bubble pack and use a corrugated box for better protection. Include a brief description of any faults suspected for the convenience of Customer Service Dept., if possible.

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**10.5 Maintenance and Cleaning****Maintenance**

The alpha CON 2000 contains no user repairable components. Please contact Eutech Instruments or its distributor if there are any problems with the unit.

**Cleaning**

To remove dust, dirt and spots, the external surfaces of the transmitter may be wiped with a damp, lint-free cloth. A mild household cleaner can also be used if necessary.

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## 11 APPENDICES

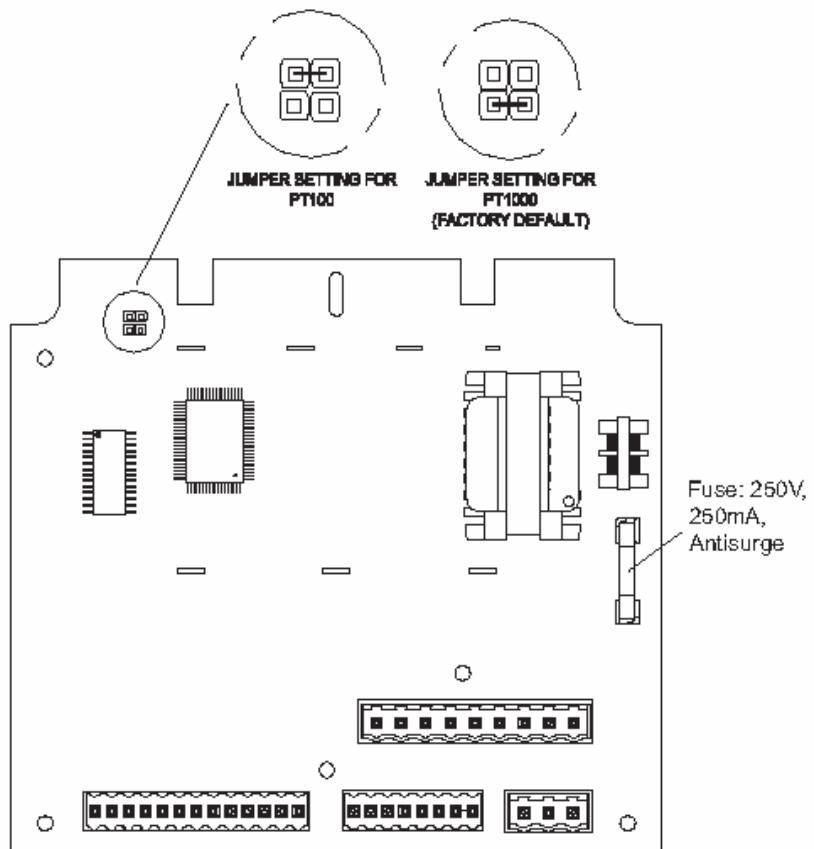
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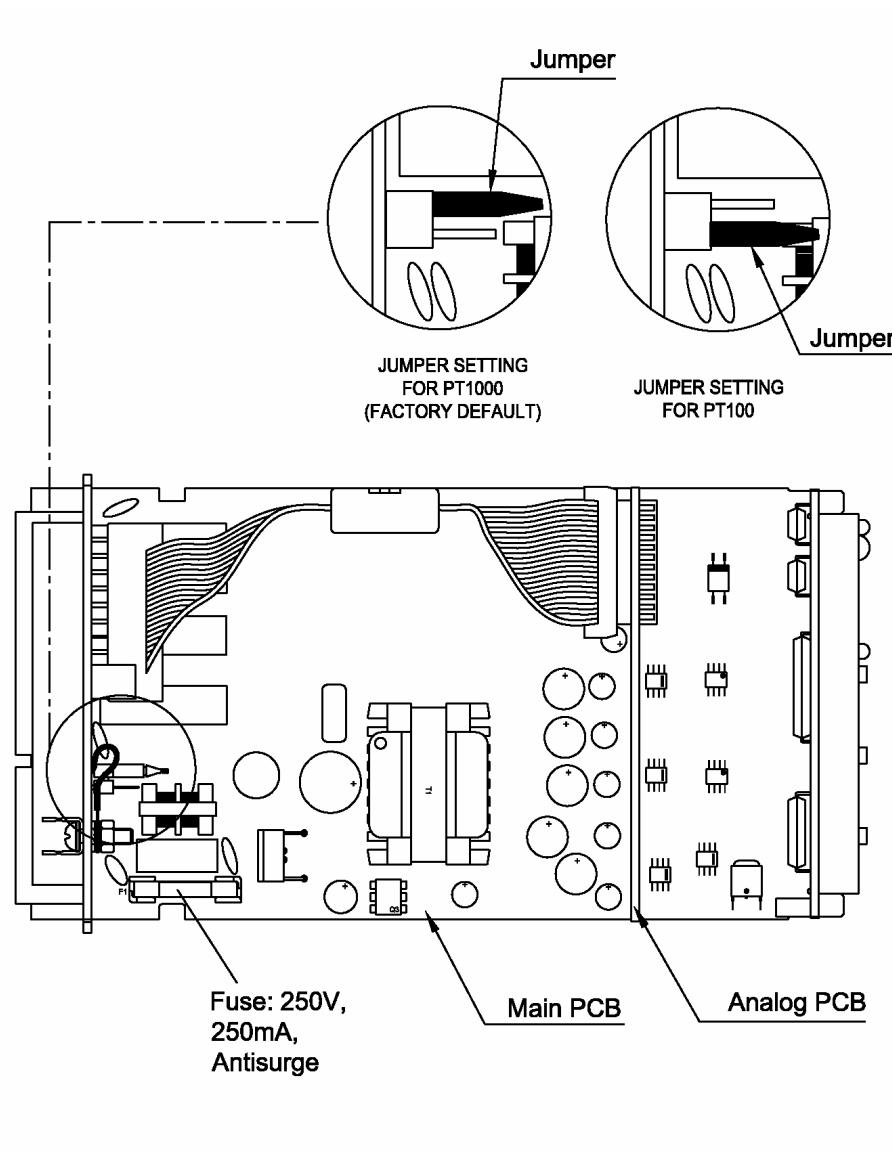
### 11.1 Appendix 1 – Unit fuse and jumper settings



Caution! Before opening the unit to replace the unit fuse or to set the jumper for Pt 100 / Pt 1000 temperature sensor, make sure the mains cable is separated from the power supply.

#### Wall mounting version (view from the back side)



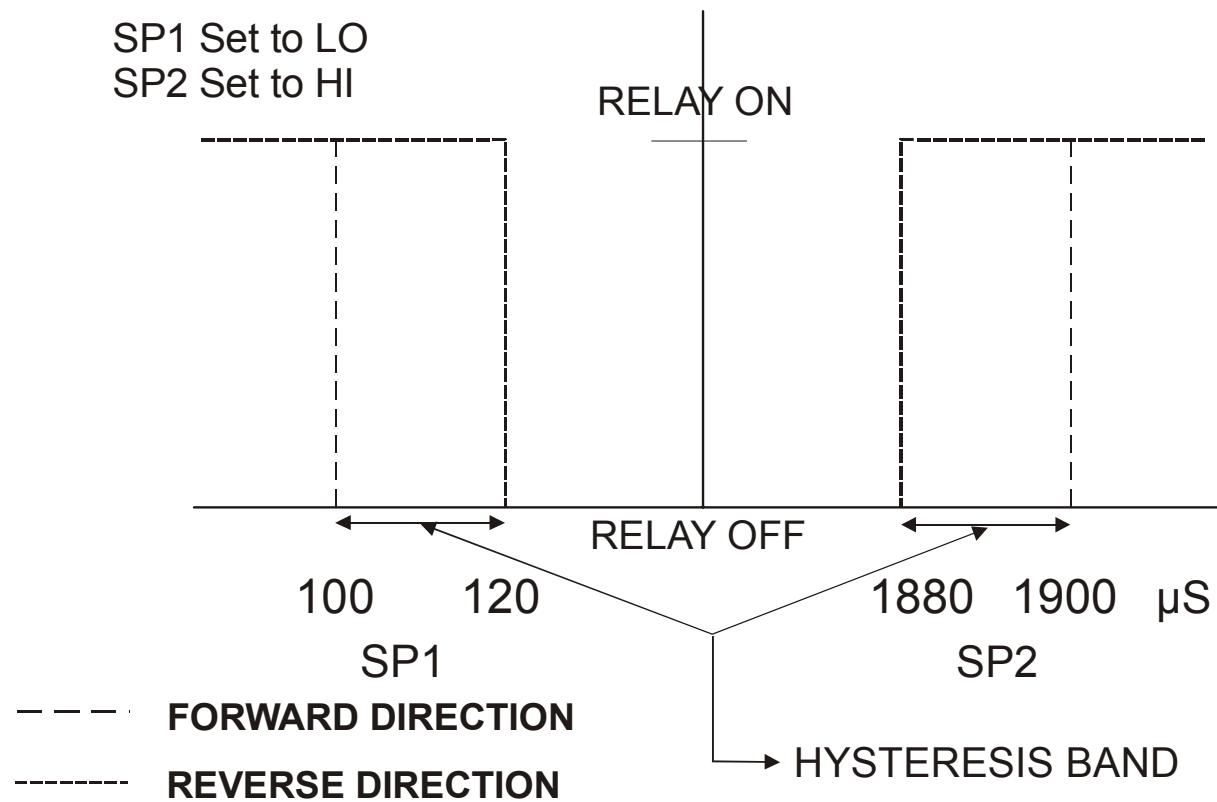
Panel mounting version (view from top)

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**11.2 Appendix 2 – Conductivity of various aqueous solutions at 25 °C / 77 °F**

	Conductivity	Resistivity
Ultra-pure Water	0.055 $\mu\text{S}/\text{cm}$	18.18 $\text{M}\Omega\text{-cm}$
Power Plant Boiler Water	0.05 - 1 $\mu\text{S}/\text{cm}$	1 - 18 $\text{M}\Omega\text{-cm}$
Distilled Water	0.5 $\mu\text{S}/\text{cm}$	2 $\text{M}\Omega\text{-cm}$
De-ionised Water	0.1 - 10 $\mu\text{S}/\text{cm}$	0.1 - 10 $\text{M}\Omega\text{-cm}$
De-mineralised Water	1 - 80 $\mu\text{S}/\text{cm}$	0.01 - 1 $\text{M}\Omega\text{-cm}$
Mountain Water	10 $\mu\text{S}/\text{cm}$	0.1 $\text{M}\Omega\text{-cm}$
Drinking Water	0.5 - 1 $\text{mS}/\text{cm}$	1 - 2 $\text{k}\Omega\text{-cm}$
Waste-water	0.9 - 9 $\text{mS}/\text{cm}$	0.1 - 1 $\text{k}\Omega\text{-cm}$
Potable Water Maximum	1.5 $\text{mS}/\text{cm}$	0.7 $\text{k}\Omega\text{-cm}$
Brackish Water	1 - 80 $\text{mS}/\text{cm}$	0.01 - 1 $\text{k}\Omega\text{-cm}$
Industrial Process Water	7 - 140 $\text{mS}/\text{cm}$	rarely stated
Ocean Water	53 $\text{mS}/\text{cm}$	rarely stated

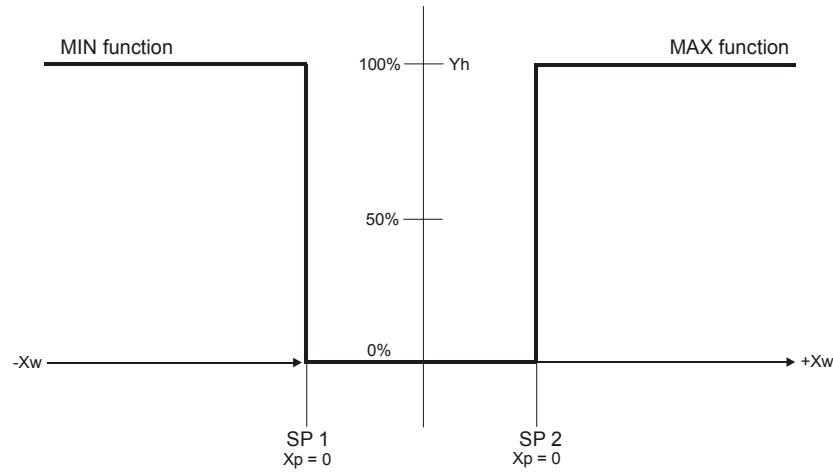
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**11.3 Appendix 3 – Simple explanation on the function of hysteresis**

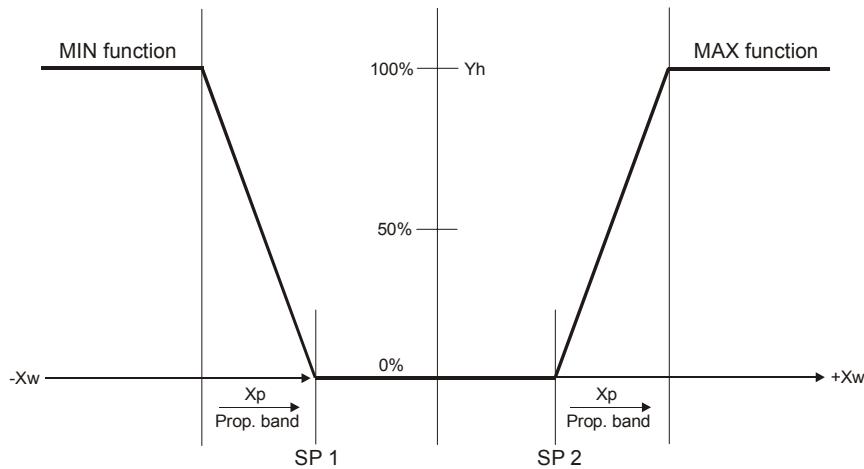
The controller relay activates when the set-point is reached. In the reverse direction, it does not de-activate when the value reaches the set-point. Instead, it continues to be active till the value reaches the amount set by the Hysteresis band.

## 11.4 Appendix 4 – General instructions concerning Controller Setting

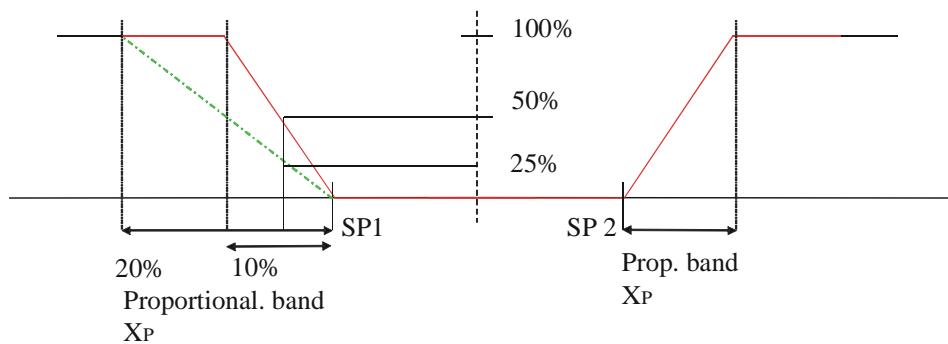
### 11.4.1 *Control characteristic of Controllers used as limit value switch*



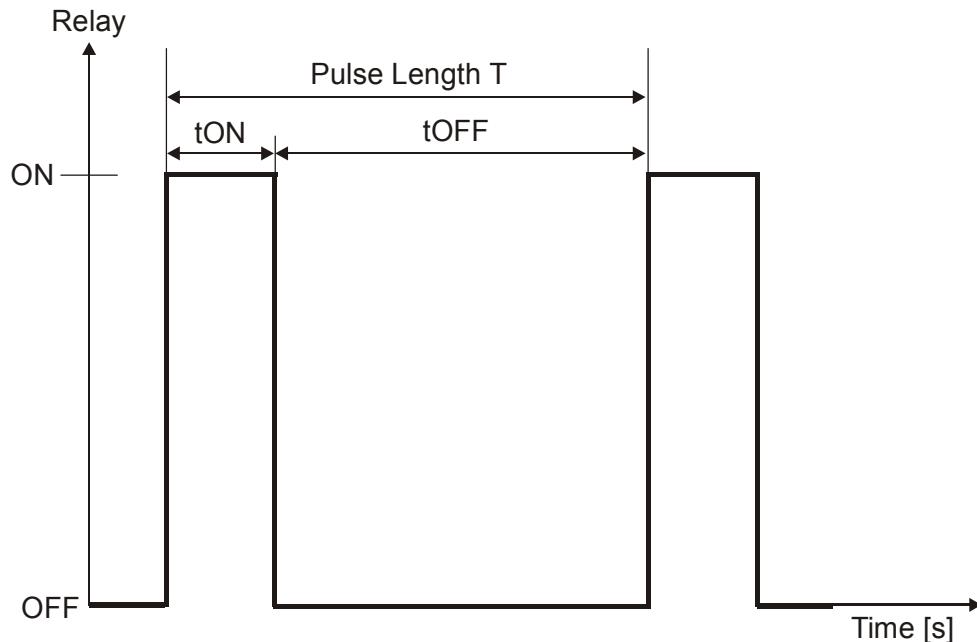
### 11.4.2 *Control characteristic of P-Controllers as proportional controller*



### 11.4.3 *Control characteristic of PI-Controllers as proportional integral controller*



#### 11.4.4 Control signal of Pulse length Controllers



The output relay of the pulse length controller is clock-timed. The switching period  $T$  remains constant. Depending on the divergence from the limit value, the switch on time  $t_{ON}$  is increased or decreased in accordance with the proportional range  $X_p$ .

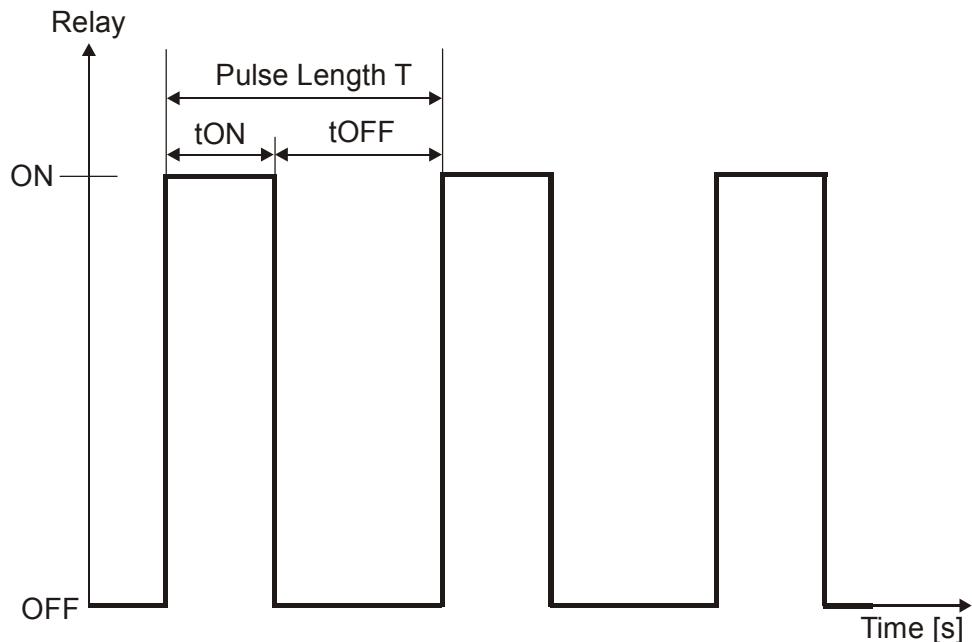
The following applies:

$$t_{ON} + t_{OFF} = T \text{ (Const.)}$$

greater divergence  $\rightarrow$  greater  $t_{ON}$

$X_p$  exceeded  $\rightarrow t_{ON} = T$  (relay remains picked up)

#### 11.4.5 Control signal of Pulse Frequency Controllers



The output relay of the pulse frequency controller is clock-timed. The pulse duration  $t_{ON}$  remains constant at 250 msec. Depending on the divergence from the limit value, the frequency ( $1/T$ ) is increased or decreased in accordance with the proportional range  $X_p$ .

The following applies:

$t_{ON} = \text{Const. (250 msec.)}$

greater divergence  $\rightarrow$  greater  $f$  (greater frequency)

$X_p$  exceeded  $\rightarrow$  max. frequency

## 11.5 Appendix 5 – Abbreviations used in menu displays

Abbreviation	Meaning	Abbreviation	Meaning
MEAS	Measurement	REL	Relay
CAL	Calibration	PRP	Proportional band
ENT	Enter	T. PL	Pulse length time
C. CD	Calibration security code	F. PF	Pulse frequency
S. CD	Setup security code	IAT	Integral action time
TC	Temperature Coefficient	MANU	Manual
LIN	Linear temperature compensation	CUR. 1	Output current 1
PUR	Pure water temperature compensation	CUR. 2	Output current 2
P. TC	Temperature coefficient for process liquid	OUT	Output signal
C. TC	Temperature coefficient for calibration liquid	4 - 20	4 to 20mA
P.	Process	0 - 20	0 to 20 mA
C.	Calibration	R.0	Value at 0 mA
SET	Setting	R. 4	Value at 4 mA
ATC	Automatic temperature calibration	R. 20	Value at 20 mA
SP1	Setpoint 1	CU22	Out of range output current 22 mA
SP2	Setpoint 2	WASH	Wash
LO	Low limit	H. INT	Cleaning interval in hours
HI	High limit	S. DUR	Cleaning duration in seconds
HYS	Hysteresis	RANG	Range
ON. D	On delay	CNFG	Configuration
OFF. D	Off delay	BKLT	Back light
CNTR	Controller	LEVL	Level
L. CT	Limit control	AL.C	Alarm Contact
PLC	Pulse length control	STDY	Steady
PFC	Pulse frequency control	FLET	Fleet, impulse
P/PI	Proportional control	AL. D	Alarm delay
EN	Energised	L. AD	Line resistance
DEEN	Deenergised	DEF	Default



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